# Kenya
# STATE OF THE CITIES



### Cities and Towns
### Cities Under the Project
### Rail Roads
### Main Roads
### Lakes
### International Boundaries
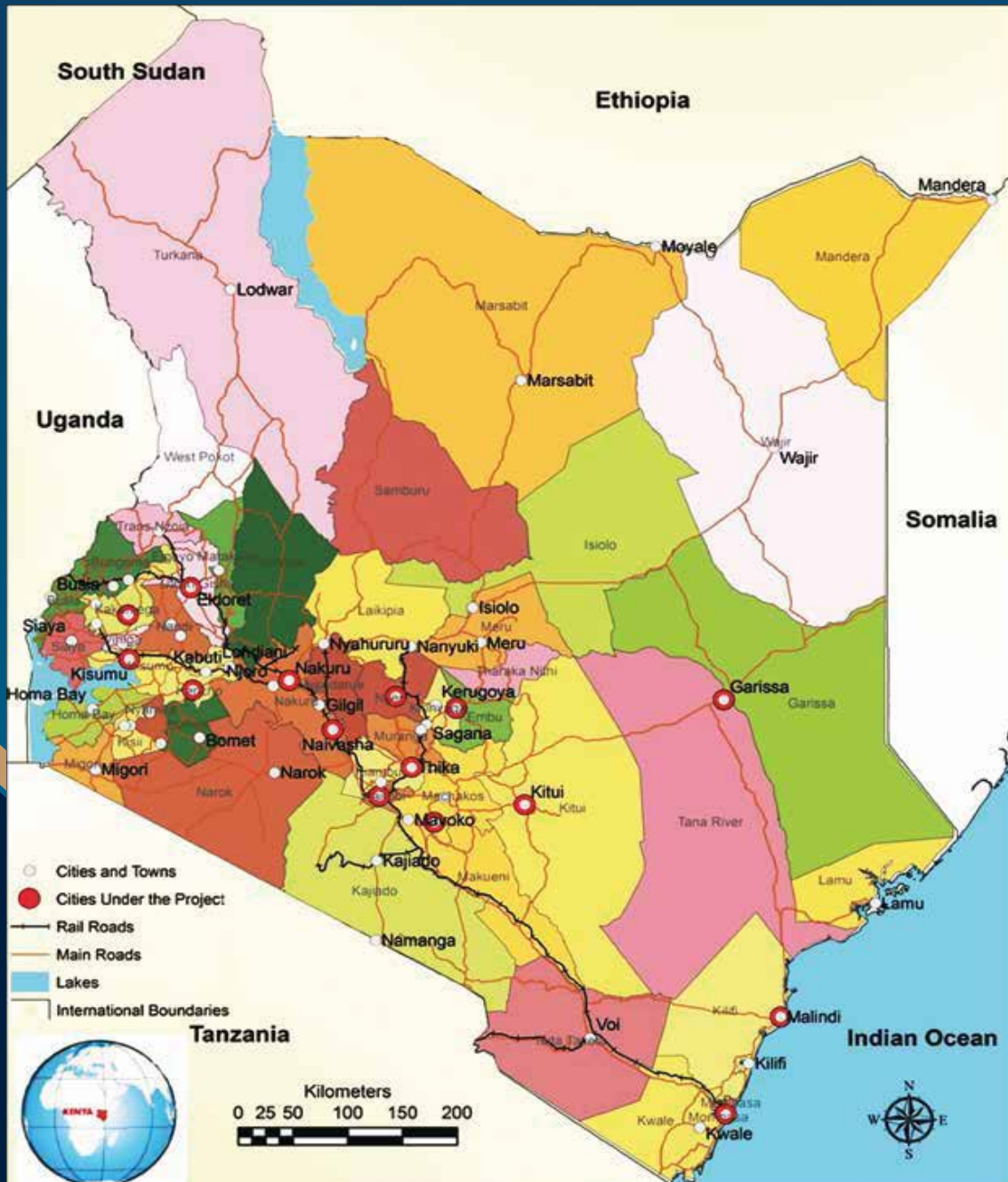
# NAIROBI

**WORLD BANK GROUP**

# KENYA STATE OF THE CITIES BASELINE SURVEY
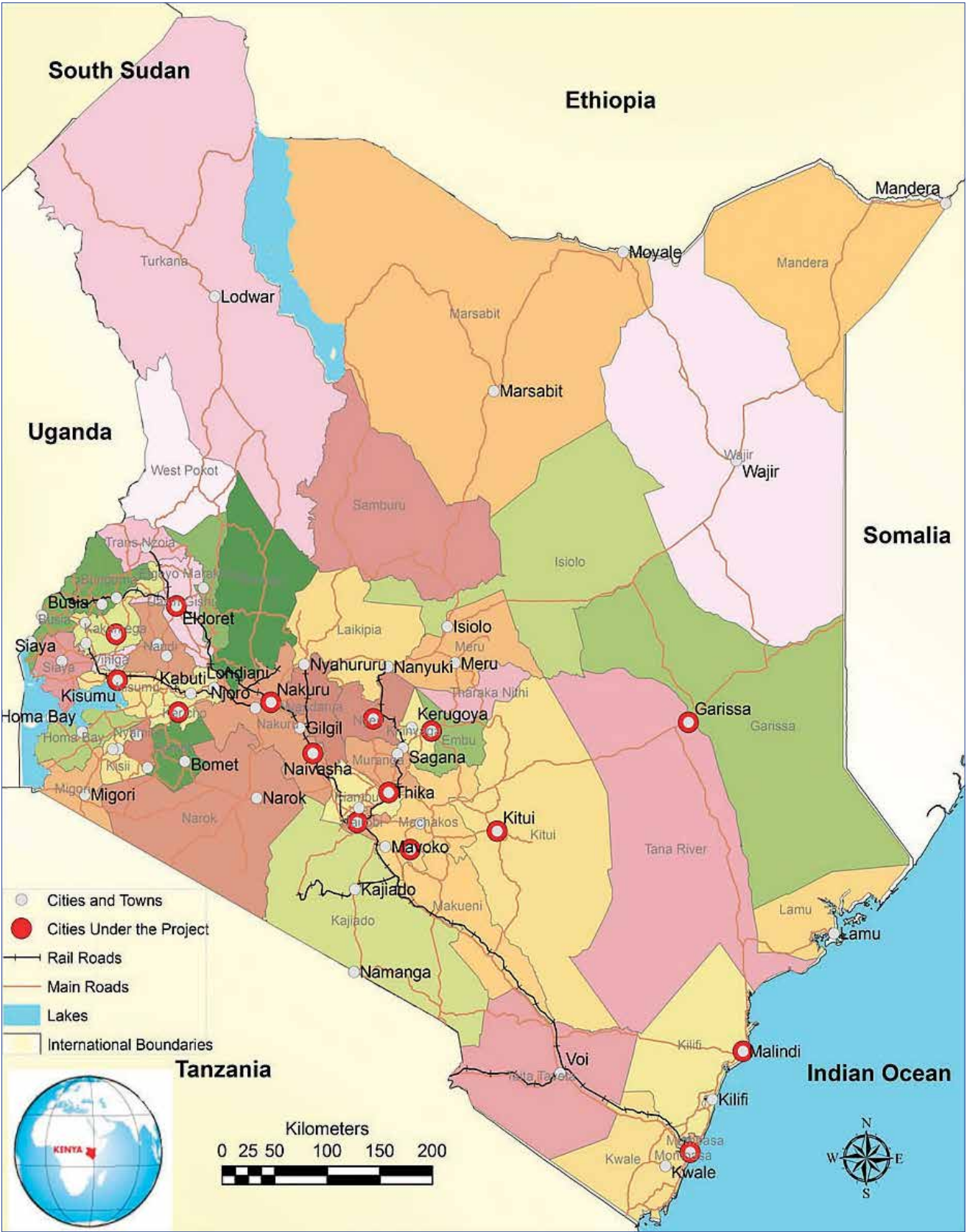
STATISTICAL ABSTRACT FOR NAIROBI, KENYA

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# ABBREVIATIONS

| | |
|---|---|
| **CAPI** | Computer Assisted Personal Interview |
| **EA** | Enumeration area |
| **GOK** | Government of Kenya |
| **HH** | Household |
| **HUD** | U.S. Department of Housing and Urban Development |
| **KIHBS** | Kenya Integrated Household Budget Survey |
| **KISIP** | Kenya Informal Settlements Improvement Program |
| **KMP** | Kenya Municipal Program |
| **KNBS** | Kenya National Bureau of Statistics |
| **NMSP** | Nairobi Municipal Service Project |
| **PDA** | Personal Digital Assistant, in this case a hand held computer used by interviewers |
| **PSU** | Primary Sampling Unit |
| **SMSA** | Standard Metropolitan Statistical Area |
| **SRS** | Simple Random Sample |
| **SSU** | Secondary Sampling Unit |
| **WB** | World Bank |
| **WBG** | World Bank Group |

# ACKNOWLEDGEMENTS

# INTRODUCTION

## Background

The Kenyan government, with the support of development partners, is increasing its investments in urban infrastructure and services. To support these efforts, the World Bank has contracted NORC at the University of Chicago to carry out a baseline study of the demographic, infrastructure, and economic profiles of fifteen Kenyan municipalities: Nairobi City, Mombasa, Naivasha, Nakuru, Malindi, Eldoret, Garissa, Embu, Kitui, Kericho, Thika, Kakamega, Kisumu, Machakos, and Nyeri. This was undertaken in order to deepen understanding of the cities' growth dynamics, and to identify specific challenges to quality of life for residents. The study, called the "Kenya State of the Cities Baseline Survey," collects and analyzes household survey data to produce key statistics and identify differences in conditions among types of households—especially differences between those living in informal versus formal settlements. The ultimate goal is to use the information to establish development priorities for infrastructure and service investments and, eventually, to track the effectiveness of these investments.

Prior to the State of the Cities survey, there were little data available to support the design of programs to improve infrastructure and related services in most Kenyan cities. While there have been several household surveys of Nairobi's informal settlements and numerous analyses using the data, few surveys or analyses have been carried out in other Kenyan municipalities or for modest-income areas in Nairobi.

To facilitate access to the rich datasets generated by the survey, three written products were commissioned: a Statistical Abstract (such as this one) for each city, a City-at-a-Glance for each city (a two-page summary of the Abstract), and an Overview Report (a more comprehensive discussion of the topics in this Introduction, a topic-by-topic comparative analysis of the fifteen cities, and appendices with the survey instrument). The Abstract's objective is to provide comprehensive but easily accessible information on the wide range of municipal conditions covered in the survey, as reported by households. Some information in the Abstract also comes from secondary sources, such as the national Census and the Kenya Integrated Household Budget Survey (KIHBS). The primary audience for the Abstract includes policy makers, development practitioners, development partners, civil society organizations, and urban residents. Better planning and more productive investments can result from exploiting the information in each city's Abstract.

## Methodology

For this baseline household survey, NORC used a two and three-stage, stratified, clustered sampling design intended to be representative of poor and non-poor households living in formal and informal settlements in the fifteen cities included in the study. The first-stage sampling frame was based on Kenya's 2009 census frame of enumeration areas (EAs). In the census sample frame, EAs are identified as urban, peri-urban or rural. EAs are further identified as containing formal or informal settlement types. For the first stage sampling, NORC selected EAs from strata identified as informal (slum), urban-formal, peri-urban-formal and rural. In cases where the EAs were "large" (200 to 700 households), they were divided in half, thirds, or quarters and one segment was randomly selected.

For the final stage of sampling, NORC carried out a full household listing in each selected EA (or segment, as the case may be) and randomly selected ten households for interviewing.[1] Because expected response rates were unknown prior to data collection, interviewers were given a target to complete at least seven interviews in each EA. In Nairobi, 193 EAs were selected in the first stage.[2] In the second stage, a total of 14,592 households were listed and 1,245 households were selected.

The data for this report are based on 1,182 completed interviews carried out in Nairobi from July 14, 2012 to December 8, 2012 by a team of eight interviewers and one supervisor. Among eligible households,[3] the completion rate was 94.94%.[4] 582 interviews were completed in informal settlements and 600 were completed in formal settlements.

## Questionnaire

The Kenya State of the Cities baseline questionnaire was developed iteratively using a base set of questions developed by the World Bank and refined to capture the key variables related to infrastructure access and municipal services of interest to the Kenyan government. The final fielded questionnaire is available in Volume II of the Overview Report. The household listing form and the questionnaire were programmed for use as a Computer-Assisted Personal Interview (CAPI) and both were carried out using 7-inch Samsung Galaxy Tab tablet computers which transmitted data to project servers via the mobile phone network. Interviewers used the tablet computers to capture GPS coordinates once during listing and again at the end of each interview.

## Data Quality

Recorded administration time of the CAPI instrument showed a median duration of 25 minutes in Nairobi (21 minutes across all municipalities). However, duration values may have been compromised by transmission problems and supervisor reviews, which may have overwritten timestamps. Despite the uncertainty of exact durations, data quality measures do not show systematic interviewer-related errors in the final data. Approximately one-third of all interviews underwent validation, including call-backs by supervisors or central office staff (in-person and by phone).

## Table Presentation

Each city's Abstract includes a set of tables designed to provide basic information on households' economic and demographic conditions, their housing conditions, and access to infrastructure and services. One challenge in preparing the Abstract was to provide a complete picture of conditions while still being selective in the information presented so as not to overwhelm the reader. A second challenge was to display the information in a way that permits stakeholders to understand conditions faced by different population groups.

To meet these challenges we have developed a set of tables with items believed to be most important for stakeholders and have broken down the items in several ways. In addition to providing an overall picture of household (HH) characteristics, the tables illustrate whether household characteristics differ by key factors. The rows of each table generally list the household characteristics (e.g., size of household, percentage of

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[1]  A complete description of the sampling design is found in "Kenya Municipal Program State of Cities: Overview Report," NORC, August 2013.

[2]  106 EAs were included in the listing activity. One EA did not include any households and therefore was dropped from the sample.

[3]  Eligible households are defined as occupied dwellings with at least one resident age 18 or older who is present during the field period.

[4]  The completion rate is the number of households that successfully completed an interview over the total number of households assigned.

children in school). The columns present statistics for the entire city, then show how the data differs by location (informal vs. formal areas), household poverty status (poor vs. non-poor), gender of the head of household (male vs. female headed, for informal areas only), as well as other factors pertinent to the particular table.[5]

From each table, one can quickly observe if there are large differences in household characteristics by location, spending power, etc., simply by comparing the cells (numbers). Each table also shows whether the observed differences are statistically significant.[6] "Statistically significant" means that statistical analysis has revealed that a difference, no matter how small or large, is unlikely due to chance or randomness. In practice, statistically significant differences are the ones researchers are interested in—they can be interpreted as telling us about meaningful differences in household characteristics by location, spending power, gender, or other category. When we discuss differences in the text of this report, we will refer to "statistically significant" differences unless otherwise noted.

In terms of policy decisions, whether differences matter is a combination of whether they are statistically significant *and* how large the differences are. Ultimately, it is up to the policy practitioner to decide how large a difference must be to matter in the context of interest. An important note when interpreting results is that statistical significance does not imply causality. In other words, if differences in values are statistically significant, this does not mean that one variable caused a change in the other variable. Another factor may be influencing both variables; for example, for we may find a "significant" difference between head-of-household education and household poverty, perhaps the key *common* cause is social status, which affects both their educational attainment and job/spending opportunities. Additionally, where a statistically significant difference is identified it does not imply the direction of the relationship. Perhaps the household poverty is the reason for the different education levels, or vice-versa. In this report, therefore, we will say a household characteristic is "associated with" or "correlated" with certain factors, rather than saying one is caused by another.

In order not to clutter the tables yet provide the reader with the maximum information, we mark statistically significant results in the tables with **bold** (for two adjacent values in the same row) and *italics* (to compare adjacent columns of data). Underlined values denote an insufficient number of household responses for some enumeration category of the sampling design to perform a test of statistical significance. The number of observations for a particular variable is noted in the tables in rows denoted by "N". Cells with no observations are indicated with hyphens (-).[7] The table, below, summarizes the formatting used in tables throughout the Abstract: A value that is both ***bold*** and *italicized* indicates statistically significant differences for two adjacent cells (i.e., values in the same row) as well as for the distributions between adjacent columns. In contrast, a value in standard font—no bolding, italics, or underlining—still means that a significance test *was* performed but that the values under comparison were not statistically significantly different from each other.

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[5] Informal/formal status was defined at the enumeration area level by the Kenya National Bureau of Statistics during the 2009 Census. Poor/non-poor is defined using the answer to a question asking respondents whether their total household expenditure in the last month was above or below a poverty line calculated using the household size (5,567 KSh for each adult 15 years and older + 3,619 KSh for each child aged 5 to 14 + 1,336 KSh for each child under 5 years old).

[6] Statistical significance is noted when a test achieves a p-value ≤ 0.05.

[7] Regarding issues of non-response, both observational and item-specific, see Section 4, below.

**Table 1: Description of formats used to denote statistical significance**

| Format | When we use it | Example |
|---|---|---|
| Bold | Two bolded values in the same row next to each other indicate that the difference is statistically significant.<br><br>We also use bold for 'Yes' or 'No' variables. If bold, it means that the difference between the mean of households that answered 'yes' (displayed) and the mean of those that answered 'no' (not displayed) is statistically significant.(a) | Table A.1 displays the mean household size for households located in formal and informal settlements; if the pair of values is bold, it means that the difference in household sizes between formal and informal areas is statistically significant.<br><br>Table B.2 displays the proportion of households which own land (or have tenure) that fall below the poverty line. If bold, it means that this proportion is statistically significantly different from the proportion of households which do not own land that fall below the poverty line. |
| Italics | We indicate statistically significant differences between columns of *three or more cells* using italics; this means the difference between the entire distributions (columns) is statistically significant. (b) | Table B.2, Monthly household spending power, displays the distribution of households across income and expense ranges. If values appear italicized in both columns for households located in formal and informal settlements, the difference between the two distributions is statistically significant. |
| Underline | Denotes values where, due to lack of data at the census tract (enumeration area, or EA) level, it was not statistically possible to conduct the significance test.(c) | Table B.3 shows the mean value of households' primary residence with and without land, and of any other residence and/or land. An underlined value means that due to lack of data at the census tract level, it is not possible to perform a test for significant differences. |
| Hyphen (-) | In cases where there are no data for a cell at all, we note that with a hyphen (-). | Table B.3 shows data related to household finance. For the percentages of households according to source of financing, the cells that display a hyphen means that there were no observations for that particular variable and category. |

*Notes*
*a.   Here a p-test from an Adjusted Wald test is conducted.*
*b.   Here Pearson's Chi-squared test is conducted.*
*c.   At least two households are required to compute a household-level variance, which is required to conduct a hypothesis test. Note that this does not imply that the respective table values are based on just one household or even just one EA.*

There is one caveat to the formatting rules that must be addressed regarding the significance testing of distributions. While the absence of italics sometimes means that the distribution *was* tested and *was not* found to be statistically significant, this is often not the case – i.e., there are many distributions which were not tested for significance. To avoid confusion, the comprehensive list of distributions which *were* tested for significance follow.

- **Table B.2a:** Expenditure ranges by location, tenure, water connection, business, skilled/unskilled head, and gender of household head (in informal areas)

- **Table B.2b:** Income ranges by location, tenure, water connection, business, skilled/unskilled head, and gender of household head (in informal areas)

- **Table C.3:** Distribution of home value ranges and rent ranges by location, tenure, water connection, business, skilled/unskilled head, and gender of household head (in informal areas)

- **Table D.1a:** Percent of households with a piped water connection inside their dwelling by security of ownership; percent of households with a piped water connection inside their compound by security of ownership; percent of households close to piped water access by security of ownership; cost of water by security of ownership; most important water source by security of ownership; reasons for no connection by security of ownership

- **Table D1.b:** Water source by water quality; water provider by water quality; water treatment buy water quality; treatment methods by water quality.

Another feature of the data worth mentioning is that outliers (responses that are very different from all the others) were not a major issue in the survey data, affecting just three variables in any important way.[8]

Finally, note that in tables presenting a distribution of responses, if some response categories are left out then the distribution will not add up to 100%. In cases where all response categories *are* listed then the first row of responses is given as 100. Unless otherwise noted, all figures presented in the tables are percentages.

The core of this abstract comprises a set of tables divided into chapters. Each chapter contains a textual summary of each table and highlights some of their implications. The tables are divided into four groups:

A. Household characteristics – 3 tables

B. Economic profile – 5 tables

C. Tenure, tenure security, dwelling characteristics – 4 tables

D. Infrastructure services – 7 tables

Notes to the tables are identified by small letters appearing as superscripts at the end of each table. All tables present weighted figures at the household level, unless otherwise noted, to reflect the total population of the respective table cell. The N values, however, present the *un*weighted number of households, unless otherwise noted.

The final chapter of this abstract contains a series of three "Development Polygons". These complement the detailed tables presented in sections A through D by illustrating an "overall" sense of the state of the city. The figures included are the Development Diamond, the Infrastructure Polygon, and the Living Conditions Diamond[9].

While the tables generally have a common set of column headings, there is some variation. The following are definitions for those headings that require clarification:

- *Informal/Formal Areas* – This distinguishes between areas based on whether most households in the area have property title and official services. It is a designation provided by a status code at the level of the EA (Enumeration area) as used by the National Census.

- *Gender (Informal)* – For the households living in the locations coded as "Informal," data for household characteristics are provided for both male- and female-headed households. As is standard, the male-headed households may contain the spouse while female-headed households do not.

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[8] *Across all fifteen municipalities these were (i) home value, in which 20 responses were reported in millions units instead of as the value itself (so we simply divided these responses by a million); (ii) 40 respondents reported travel time for a weekly or monthly commute rather than a daily commute (these over-eight-hours responses were dropped); (iii) we removed one case in which the time to get water was over a week.*

[9] *The basic format for all three figures appear in the World Bank Policy Research Working Paper, "Poverty, Living Conditions, and Infrastructure Access" A Comparison of Slums in Dakar, Johannesburg, and Nairobi" by Sumila Gulyani, Debabrata Talukdar, and Darby Jack (2010). We strived to make our own figures as similar as possible, though some deviations, noted in the accompanying text, were necessary.*

- *Class (of durable)* – Durable assets are a standard measure of household wealth. They are grouped into three classes, roughly based on their likely market value and degree of permanence. The actual items in each class are indicated in the table. The values reported for these categories are the number owned by the household, not their average or total value.

- *Spending Power* – The total value of household expenditures collected by the survey, excluding rent or mortgage payments.

- *Access to Infrastructure* – This indicator combines six categories of infrastructure (divided into 13 subcategories) weighted by importance to the household and summed to create a household indicator from 0 to 9.5. See NORC (August 2013), "Kenya Municipal Program State of the Cities: Overview Report" for a more detailed description.

- *Household Poverty* – The poverty line varies depending on the number of members of the household and their age.  It is calculated by adding together:

  - 5,567 KSh per month for each adult 15 years and older in household,

  - 3,619 KSh per month for each child aged 5 to 14 in household,

  - 1,336 KSh per month for each child under 5 years old in household.

# PART A:
# HOUSEHOLD CHARACTERISTICS

This section presents basic household characteristics. Table A.1 provides information on household size and household member distribution by age category. Table A.2 details the level of education of the members of household, as well as the proportion of children and adults of different ages who were currently in school at the time of the survey. Finally, Table A.3 presents household health characteristics, including the proportion of children under 15 who have received the BCG vaccine (an immunization against tuberculosis), a major public health concern given that Kenya is a high-tuberculosis-burden country.[10] Table A.3 also includes the number of household members with an illness or injury in the two weeks prior to the survey, the proportion of those members who visited a health practitioner, average household medical expenditures for the month preceding the survey, and the percentage of households that have health insurance. All of these figures are given comprehensively and broken down by location type, the household's poverty status, and the gender of head of household (among informal areas).

## A.1 Household demographic composition

The 2009 census estimated that the municipality of Nairobi had a population of 3,133,518, a 46% increase over the figure reported in the 1999 census; this represents a 3.87% annualized average growth rate.[11]

The average household size in Nairobi is 3.2 members, and there are statistically significant differences by location, poverty status, and gender of head of household. Households in informal areas are smaller, on average, than those in formal areas (2.9 vs. 3.3). Poor households, with expenditures falling under the poverty line, are larger; they average 3.3 members while households above the poverty line average only three members. Male-headed households in informal areas are also significantly larger than female-headed households in informal areas, at 3 vs. 2.4 on average.

On average, 72.9% of households' members are aged 15 to 60 years old, 12.3% are between 5 and 14 years old, 11.4% are under 5 and only 1.3% are over 60. Households in informal areas have a higher percentage of children under 5 years old than households in formal areas. The head of household is male in 77% of all households, and there are no significant differences by location or poverty status. About half of female-headed households are located in formal areas; perhaps unexpectedly, only about 39% of female-headed households are poor.

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[10]  *World Health Organization Global tuberculosis report 2012, retrieved June 12th 2013 from http://www.who.int/tb/publications/global_report/en/*

[11]  *From Statistical Abstract 2010 and Statistical Abstract 2006, Kenya National Bureau of Statistics.*

## Table A.1: Household demographic characteristics

| Characteristic | All | Location | | Household poverty | | Gender (Informal) | |
|---|---|---|---|---|---|---|---|
| | | Informal areas | Formal areas | Poor | Non-poor | Male-headed | Female-headed |
| Number of households | | | | | | | |
| Weighted | 880,874 | 363,417 | 517,457 | 375,491 | 480,139 | 256,788 | 88,036 |
| N (unweighted) | 1,178 | 581 | 597 | 535 | 606 | 424 | 127 |
| Size of household | 3.16 | **2.93** | **3.32** | **3.29** | **3.05** | **3.05** | **2.37** |
| N | 1,178 | 581 | 597 | 535 | 606 | 424 | 127 |
| Mean percent of household members aged: | | | | | | | |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Under 5 | 11.4 | 13.0 | 10.2 | 12.3 | 10.8 | 12.4 | 13.9 |
| 5 to 14 | 12.3 | 11.7 | 12.8 | 12.7 | 12.1 | 10.7 | 13.7 |
| 15 to 60 | 72.9 | 72.6 | 73.0 | 71.9 | 73.9 | 74.0 | 70.0 |
| Over 60 | 1.3 | 0.8 | 1.6 | 1.3 | 1.3 | 0.7 | 0.9 |
| N | 1,178 | 581 | 597 | 535 | 606 | 424 | 127 |
| Proportion of households… | | | | | | | |
| Male-headed | 77 | 74 | 78 | 80 | 74 | | |
| Female-headed | 23 | 26 | 22 | 20 | 26 | | |
| N | 1,125 | 551 | 574 | 513 | 577 | | |
| Female-headed distribution | | 45 | 55 | 39 | 61 | | |
| N | | 251 | 243 | | | | |

## A.2 Household education characteristics

In the former Nairobi province, primary classrooms in 2009 had an average class size of 41 students and secondary classrooms had on average 34 students. Student-teacher ratios in the former Nairobi Province were, on average, 56.2 for primary schools and 34 for secondary schools.[12]

The first panel of Table A.2 presents statistics on the education of *all individuals aged 5 years and older* within the surveyed households. Forty-nine percent of all individuals have completed secondary school or higher—a figure that is likely skewed by the fact that the majority of household members are aged between 15 and 60 years old—and 75% completed primary or higher. Significant differences in education level were found by location and poverty status but not by gender of household head. A significantly higher percentage of individuals in formal areas had higher education as compared to informal households, and the difference was dramatic (33% vs. 13%); by contrast, an informal household's individuals highest grade completed was significantly more likely to be some or all of primary school compared to individuals in formal areas. A significantly higher percentage of individuals in non-poor areas also had higher education as compared to poor households (32% vs. 17%), while, in poor households, individuals' highest grade completed was significantly more likely to be some or all of primary school comp. Having "no education" is rare at 2% overall, and did not differ significantly by area, poverty status, or gender of household head.

The second panel of the table shows the mean percent of *adult individuals over 18 years* **within** each household. This is done to show intra-household educational levels among households' adult members. We find that on average, 61.8% of a household's adults have completed secondary school or higher. In Nairobi, higher education rates were high for adults: fully 30% had some higher education. Over 90% completed

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[12] *Provinces no longer exist in Kenya. This data is based on the Kenyan Institute for Public Policy Research and Analysis 2009 Economic Report, Table A3.16, pg. 192, per Ministry of Education statistics, http://www.marsgroupkenya.org/pdfs/2009/10/Kenya_Economic_Report_2009.pdf Section*

primary or higher. Only an average of 1.7% of households' adults had no education whatsoever. For 16.7% primary was the highest grade completed, for 11.6% some secondary was the highest level of education completed, and, finally, for 7% some primary was the highest level of education completed. By location, households' adults in informal areas were significantly more likely to have completed only some primary, all primary, or some secondary; those in formal areas were significantly more likely to have completed higher education, and this difference is substantial (40.5% vs. 15%). Significant differences in education level by category for adults were also evident by poverty status—households above the poverty line have a significantly higher share of adults with higher education, while poor households have a significantly higher share of adults with some or all primary as the highest grade completed (37.9% had higher education in non-poor households while 20% had higher education in poor households)

The third section of the table shows enrollment figures: 88.6% of individuals aged 5 to 14 years old, 76.6% of individuals 15 to 18, and 14% of individuals over 18 are currently enrolled in school. For individuals over 18, a significantly higher number are in school in formal areas than informal areas (18.9% vs. 7.1%). For the other age groups, any differences in enrollment by location, poverty status, or gender of head of household were not statistically significant or were not able to be tested for significance due to a lack of data at the census tract level.

**Table A.2: Household education characteristics**

| Characteristic | All | Location | | Household poverty | | Gender (Informal) | |
|---|---|---|---|---|---|---|---|
| | | Informal areas | Formal areas | Poor | Non-poor | Male-headed | Female-headed |
| Percent of *individuals 5 and older* with highest grade completed: | | | | | | | |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| None | 2 | 2 | 2 | 2 | 2 | 1 | 3 |
| Some Primary | 22 | **26** | **20** | **26** | **19** | 26 | 27 |
| Completed primary | 14 | **20** | **11** | **17** | **12** | 22 | 17 |
| Some secondary | 12 | 13 | 11 | 13 | 11 | 13 | 13 |
| Completed secondary | 24 | 26 | 24 | 26 | 23 | 27 | 23 |
| Higher | 25 | **13** | **33** | **17** | **32** | 11 | 17 |
| N | 3,118 | 1,431 | 1,687 | 1,469 | 1,552 | 1,083 | 256 |
| Mean percent of household's *adults over 18* with highest grade completed: | | | | | | | |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| None | 1.7 | 2.0 | 1.5 | 1.9 | 1.4 | 1.5 | 3.3 |
| Some Primary | 7.0 | **11.1** | **4.0** | **9.9** | **4.7** | 9.8 | 13.3 |
| Completed primary | 16.7 | **22.9** | **12.4** | **19.8** | **14.2** | **25.5** | **16.8** |
| Some secondary | 11.6 | **14.5** | **9.5** | 12.5 | 10.7 | 13.3 | 16.5 |
| Completed secondary | 31.8 | 33.5 | 30.5 | 33.9 | 30.4 | 35.3 | 29.7 |
| Higher | 30.0 | **15.0** | **40.5** | **20.0** | **37.9** | 13.8 | 18.5 |
| N | 1,174 | 581 | 593 | 533 | 606 | 424 | 127 |
| Percent of *individuals* in school by age group: | | | | | | | |
| 5 to 14 | 88.6 | 87.7 | 89.1 | 92.2 | 85.5 | 94.4 | 75.3 |
| N | 427 | 188 | 239 | 204 | 210 | 132 | 42 |
| 15 to 18 | 76.6 | 64.4 | 82.6 | 72.1 | 80.1 | 71.5 | 55.3 |
| N | 173 | 71 | 102 | 87 | 80 | 52 | 14 |
| Over 18 | 14.0 | 7.1 | 18.9 | 11.3 | 16.0 | 7.0 | 7.2 |
| N | 1,171 | 581 | 590 | 531 | 605 | 424 | 127 |

## A.3 Household health profile

The former Nairobi province had in 2005 an average of 26.1 doctors and clinical officers and 93 nurses per 100,000 residents.[13] The former Nairobi province had an average of 52.4 medical facilities per 100,000 residents, including hospitals, clinics, dispensaries, and other types of facilities.[14]

Overall, 91% of households report their children under 15 have received BCG (tuberculosis) immunizations. Sixteen percent of households had a sick or injured household member in the two weeks prior to the interview, and 81% of these visited a health practitioner. Household medical expenses averaged 6,647 KSh in the month prior to the survey, and varied dramatically by location and poverty status. Due to a lack of data at the census tract level we were not able to test these differences for significance.

Rates of health insurance coverage are quite low overall (30%). The percent of households with health insurance varied significantly by area type, poverty status, and gender of head of household, with those in formal areas having higher rates of insurance (37%) than in informal areas (20%), those in non-poor households having much higher rates of insurance (37%) than those in poor households (21%), and male-headed households having higher rates of insurance (25%) than those in female-headed households (8%). Many figures in the table could not be tested for statistical significance due to a lack of data at the census tract level.

**Table A.3: Household health characteristics**

| Characteristic | All | Location | | Household poverty | | Gender (Informal) | |
|---|---|---|---|---|---|---|---|
| | | Informal areas | Formal areas | Poor | Non-poor | Male-headed | Female-headed |
| Percent of household's children under 15 having received BCG immunization | 91 | 92 | 91 | 92 | 91 | 93 | 89 |
| N | 682 | 332 | 350 | 328 | 337 | 239 | 70 |
| Percent of households with an injured/ill member, previous two weeks | 16 | 22 | 12 | 15 | 18 | 22 | 18 |
| N | 1,178 | 581 | 597 | 535 | 606 | 424 | 127 |
| Percent of ill household members that visit a health practitioner, previous two weeks | 81 | 77 | 85 | 79 | 81 | 81 | 72 |
| N | 198 | 122 | 76 | 85 | 110 | 86 | 26 |
| Household medical expenditures (KSh), previous month | 6,647 | 1,066 | 10,820 | 1,089 | 11,470 | 629 | 326 |
| N | 1,109 | 566 | 543 | 514 | 564 | 412 | 124 |
| Percent of households with health insurance | 30 | 20 | 37 | 21 | 37 | 25 | 8 |
| N | 1,160 | 573 | 587 | 530 | 600 | 418 | 125 |

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[13] *2004/2005 numbers of healthcare providers obtained from Partners for Health Reformplus 2006 Report, Table A1, pg. 39, Annex A, statistics obtained from Rep. of Kenya. www.healthsystems2020.org/files/1654_file_Tech101_fin.pdf. Per capita figures calculated by dividing by 2005 (estimated) population obtained from the Kenya Integrated Household Budget Survey, Table 3.1, http://www.knbs.or.ke/pdf/Basic%20Report%20(Revised%20Edition).pdf.*

[14] *Based on most current (undated) figures from Kenya Bureau of Statistics Open Kenya online database, https://kenya.socrata.com/Health-Sector/Health-Facility-Pie-Chart/yre4-763w. Per capita figures calculated by dividing by 2009 census population, obtained from 2010 Statistical Abstract, Kenya National Bureau of Statistics.*

## B.1 Household occupational composition

Table B.1 presents the current occupation, or main activity, of household members. The first panel shows the percent of *all adults* over 18 in each of the occupations. The five most prominent occupation categories are regular employee, casual employee, self-employed, student and homemaker, and 12.9% are unemployed. Individuals in informal areas are more likely to be casual employees and unemployed looking for work compared to those in formal areas; those in formal areas are more likely to be regular employees or students than those in informal areas. Individuals in poor households were more likely to be causal employees and homemakers than those in non-poor households, who were more likely to be regular employees or self-employed; notably, there were no significant differences in unemployment by poverty status. Female-headed households in informal areas were significantly more likely to be unemployed and actively looking for work than their male-headed counterparts.

The second panel shows the average percent of adults over 18 *within each household* that are occupied in each of the categories. This is done to show intra-household occupational status among households' adult members. The results here are similar to those in the first panel above. Here, we find that on average, nearly two-thirds (60.5%) of a household's adult members are either regular employees, casual employees, or self-employed. Within each household, 12.1% are unemployed (8.7% are looking for work, and 3.4% are not looking), 10.6% are homemakers, and 8.9% are students. Significant differences are similar to the first table, varying by poverty status and location, but also by gender of head of household. Individuals in informal area households were significantly more likely to be causal employees than those in formal area households, who were more likely to be regular employees. Individuals in poor households were significantly more likely to be causal employees than those in non-poor households, who were more likely to be regular employees or self-employed. By gender, female-headed households were significantly more likely to be self-employed than male-headed households. Male-headed households had a significantly higher proportion of homemakers than female-headed households.

**Table B.1: Household members' main activity**

| Occupation[a] | All | Location | | Household poverty | | Gender (Informal) | |
|---|---|---|---|---|---|---|---|
| | | Informal areas | Formal areas | Poor | Non-poor | Male-headed | Female-headed |
| Percent of *adults over 18* with occupation: | | | | | | | |
| Employer | 0.3 | 0.0 | 0.4 | 0.0 | 0.5 | 0.0 | 0.0 |
| Regular employee | 28.8 | **23.9** | **31.7** | **23.4** | **32.7** | 24.8 | 22.5 |
| Casual employee | 19.1 | **29.2** | **13.0** | **25.4** | **14.6** | 30.9 | 27.9 |
| Self-employed | 12.6 | 11.0 | 13.6 | 10.4 | 14.3 | 10.6 | 16.1 |
| Unpaid family worker | 0.4 | 0.1 | 0.6 | 0.5 | 0.3 | 0.0 | 0.6 |
| Apprentice | 0.2 | 0.0 | 0.3 | 0.0 | 0.3 | 0.0 | 0.0 |
| Student | 11.8 | **5.8** | **15.4** | 10.6 | 12.8 | 4.0 | 9.0 |
| Pensioner/investor | 0.6 | 0.2 | 0.9 | 0.3 | 0.9 | 0.1 | 0.0 |
| Earning from investments/ property | 0.0 | 0.1 | 0.0 | 0.1 | 0.0 | 0.1 | 0.0 |
| Sick/unable to work | 0.4 | 0.1 | 0.6 | 0.3 | 0.5 | 0.1 | 0.0 |
| Unemployed looking for work | 9.1 | **11.2** | **7.8** | 10.3 | 8.1 | **9.2** | **14.5** |
| Unemployed, not looking for work now | 3.8 | 3.9 | 3.8 | 3.8 | 3.8 | **4.7** | **1.4** |
| Homemaker | 11.5 | 13.2 | 10.5 | **13.7** | **9.7** | **14.9** | **5.7** |
| N | 2,317 | 1,059 | 1,258 | 1,073 | 1,176 | 807 | 184 |
| Mean percent of household's *adults over 18* with occupation: [b] | | | | | | | |
| Employer | 0.2 | 0.0 | 0.4 | 0.0 | 0.4 | <u>0.0</u> | <u>0.0</u> |
| Regular employee | 29.8 | **25.3** | **32.9** | **23.2** | **34.5** | 25.9 | 25.5 |
| Casual employee | 22.4 | **32.1** | **15.5** | **28.5** | **18.2** | **33.7** | **31.0** |
| Self-employed | 13.3 | 11.3 | 14.7 | **10.2** | **15.6** | 9.9 | 17.3 |
| Unpaid family worker | 0.2 | 0.0 | 0.4 | 0.4 | 0.4 | 0.0 | 0.2 |
| Apprentice | 0.3 | 0.0 | 0.4 | 0.0 | 0.5 | <u>0.0</u> | <u>0.0</u> |
| Student | 8.9 | **4.4** | **12.0** | 8.4 | 9.2 | 2.9 | 5.7 |
| Pensioner/investor | 0.4 | 0.1 | 0.6 | 0.2 | 0.6 | 0.1 | 0.0 |
| Earning from investments/ property | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 |
| Sick/unable to work | 0.3 | 0.0 | 0.4 | 0.2 | 0.3 | 0.0 | 0.0 |
| Unemployed looking for work | 8.7 | 9.9 | 7.9 | 10.0 | 7.8 | 8.7 | 10.8 |
| Unemployed, not looking for work now | 3.4 | 3.4 | 3.4 | 3.6 | 3.1 | 4.3 | 1.2 |
| Homemaker | 10.6 | **12.1** | **9.6** | **13.4** | **8.2** | **13.8** | **5.8** |
| N | 1,174 | 581 | 593 | 533 | 606 | 424 | 127 |

*Notes:*
*a. The category "Other" has been omitted.*
*b. These numbers are obtained by first computing the percentages of each household's members in each category, and then taking the mean of these percentages over all households.*

## B.2 Household income/expenditure levels

There are two general approaches to measure spending power: expenditure and income, both of which are shown in the tables below. In the survey, income derives from household members' salaries, business earnings, rents, public cash support, and earnings from financial assets in the month prior to the interview, but does not include any remittances. Expenditures include all purchases, including investments for household-owned businesses. In theory, both approaches express the same amount of spending power, but typically one approach is not enough, especially when estimations are based on survey data. This is because survey respondents' perceptions about their income and expenditures can be unreliable; estimates vary depending on seasonal changes in economic activities, type of assets owned, household's cash flows, and in-kind payments.

In practice, the expenditure approach is usually more accurate because most respondents, making purchases daily, recall their expenses better. Income, on the one hand, can be problematic because it can be subject to respondent mis-reporting (e.g., desire to impress the enumerator) and, with non-wage income; respondents do not generally make a clear distinction between revenue (sales) and income (revenue minus expenses). Using both methods, therefore, provides an additional level of verification.

About half (44%) of Nairobi households have monthly expenditures below the poverty line, as determined by the household composition. The proportion of households below the poverty line is significantly lower among formal areas than informal areas (40% vs. 49%). It is also lower among households with tenure - 19% of those with tenure are below the poverty line while 46% of those without tenure are below the poverty line (second figure not shown in table).  In addition, the proportion of poor households is also significantly lower among households with a water connection (only 24% among those with a water connection are below the poverty line vs. 52% of those without (second figure not shown in table)), among households with a business, and among those where the head of household works in a "skilled" profession as compared with those who do not.

Looking at the overall average expenditure distribution, the most prevalent category is 18,001-30,000 KSh per month; 25% of Nairobi households fall into this category. Only 6% spend more than 75,000 KSh/month. As indicated by the *italics*, the entire household expenditure distribution varies significantly by location, tenure, whether the households have a water connection, and by head of household work skill status. Households in formal areas have expenditures at the higher end of the spectrum as compared to those in less formal areas, and households with tenure, water connection, or a business have expenditures at the higher end of the spectrum as compared to those without.  Finally, as one may expect, households tend to spend significantly more when the head is a skilled worker; 31% of skilled worker headed households are in the highest two categories of the expenditure spectrum while only 14% with unskilled heads belong to this higher end.

In B2.b, average income distributions reveal a somewhat more even distribution of wealth than expenditures; 17% of households fall evenly into four income categories ranging from 9,000 to 75,000 KSh per month. There was not enough data at the census tract level to test whether income differed significantly by household characteristics.

On average, households who sent money to individuals outside their household sent an average of 5,865 KSh in the three months prior to the interview, and those that received remittances received an average of 20,000 KSh during the same period. Wealthier households were steadily more likely to send money than those who are worse off—in the "Transfers" column, we see that 70% of households in the top expenditure category sent money to friends or relatives, compared to only 25% of those in the bottom category. However, the proportion of households receiving remittances (transferred income) was fairly evenly dispersed. There was not enough data at the census tract level to test whether transfers and remittances differed significantly by household characteristics.

**Table B.2a: Monthly household spending power, as measured by expenditure**

| Characteristic | All | Location | | Household has… | | | Household head is[c] | | Gender (Informal) | | Value of transfer (row pct.)[e] |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | Informal areas | Formal areas | Ten-ure[a] | Water connec-tion | A busi-ness[b] | Skilled | Un-skilled | Male-headed | Female-headed | |
| Percent of Households below poverty line | 44 | **49** | **40** | **19** | **24** | **34** | **39** | **47** | 51 | 44 | |
| N | 1,141 | 557 | 584 | 83 | 275 | 235 | 432 | 709 | 408 | 120 | |
| Mean expenditure (monthly KSh) | 27,512 | 24,261 | 29,794 | **66,402** | **54,552** | **31,740** | **33,621** | **23,341** | 19,813 | 19,986 | |
| N | 1,178 | 581 | 597 | 87 | 288 | 245 | 440 | 738 | 424 | 127 | |
| Percent of households with expenditure:[d] | | | | | | | | | | | |
| Less than 3,000 KSh | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 2 | 1,930 (25%) |
| 3,001-6,000 KSh | 8 | **11** | **7** | 3 | **4** | **4** | **5** | **11** | 10 | 16 | 3,115 (40%) |
| 6,001-9,000 KSh | 13 | **16** | **10** | 5 | 7 | 7 | 9 | 15 | 18 | 9 | 4,160 (51%) |
| 9,001-30,000 KSh | 17 | **21** | **14** | **6** | **6** | **11** | **12** | **20** | 20 | 25 | 4,954 (53%) |
| 13,001-18,000 KSh | 15 | **19** | **13** | **2** | **8** | 16 | 14 | 16 | 19 | 23 | 5,883 (63%) |
| 18,001-30,000 KSh | 25 | **20** | **28** | 32 | 24 | 33 | 28 | 22 | 22 | 15 | 6,272 (67%) |
| 31,001-75,000 KSh | 15 | **7** | **21** | **27** | **33** | **22** | **21** | **11** | 7 | 8 | 12,298 (69%) |
| Above 75,000 KSh | 6 | 4 | 7 | **25** | **18** | 7 | 10 | 3 | 4 | 4 | 21,402 (70%) |
| N | 1,178 | 581 | 597 | 87 | 288 | 245 | 440 | 738 | 424 | 127 | 695 |
| Cash transfers[e] | 5,865 | 4,450 | 7,254 | 26,961 | 9,967 | 8,504 | 5,938 | 5,816 | 5,804 | 3,133 | |
| N | 185 | 88 | 97 | 13 | 50 | 44 | 57 | 128 | 50 | 32 | |

*Notes:*
  *a.   Household possesses deed or other officially recognized document conferring ownership of the structure, land, or both.*
  *b.   "Business" refers to a self-employed activity that may or may not entail household or wage employees.*
  *c.   Includes those self-declared as "skilled" as well as "professional".*
  *d.   An imputed 30-day value from responses over several periods (7 days for food, 30 days for other consumables, 12 months for durables and annual services). See Volume I in the Overview Report. No significance test performed on this column.*
  *e.   Transfers are cash outflows over last three months averaged over households with such flows (equal to proportion of row households in parentheses).*

**Table B.2b: Monthly household spending power, as measured by income**

| Character-istic | All | Location | | Household has... | | | Household head is[c] | | Gender (Informal) | | Value of remittance (row pct.)[d] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Informal areas | Formal areas | Tenure[a] | Water connec-tion | A busi-ness[b] | Skilled | Un-skilled | Male-headed | Female-headed | |
| Proportion of households with income:[d] | | | | | | | | | | | |
| Less than 3,000 KSh | 3 | 4 | 2 | 2 | 1 | 3 | 1 | 4 | 2 | 9 | 10,039 (22%) |
| 3,001-6,000 KSh | 8 | 11 | 6 | 1 | 2 | 5 | 4 | 11 | 9 | 17 | 6,190 (18%) |
| 6,001-9,000 KSh | 12 | 17 | 9 | 3 | 3 | 13 | 6 | 17 | 17 | 21 | 14,216 (18%) |
| 9,001-30,000 KSh | 17 | 21 | 14 | 2 | 8 | 14 | 12 | 22 | 23 | 16 | 6,198 (13%) |
| 13,001-18,000 KSh | 17 | 20 | 14 | 7 | 3 | 12 | 17 | 16 | 21 | 13 | 12,571 (18%) |
| 18,001-30,000 KSh | 17 | 16 | 18 | 21 | 15 | 19 | 19 | 15 | 17 | 12 | 13,103 (11%) |
| 31,001-75,000 KSh | 17 | 8 | 24 | 20 | 40 | 23 | 26 | 10 | 8 | 9 | 24,967 (22%) |
| Above 75,000 KSh | 9 | 3 | 13 | 44 | 28 | 11 | 15 | 4 | 3 | 4 | 83,345 (17%) |
| N | 1,041 | 542 | 499 | 65 | 235 | 213 | 396 | 645 | 394 | 120 | 170 |
| Cash remittances[e] | 20,035 | 11,337 | 26,703 | 75,457 | 40,673 | 17,455 | 27,253 | 16,064 | 13,686 | 9,207 | |
| N | 185 | 88 | 97 | 13 | 50 | 44 | 57 | 128 | 50 | 32 | |

Notes:
a. Household possesses deed or other officially recognized document conferring ownership of the structure, land, or both.
b. "Business" refers to a self-employed activity that may or may not entail household or wage employees.
c. Includes those self-declared as "skilled" as well as "professional".
d. Total household cash income in KSh, previous month, not including in-kind income or cash assistance from/to family or friends who live outside the household. No significance test performed on this column.
e. Remittances are cash inflows over last three months averaged over households with such flows (equal to proportion of row households in parentheses).

## B.3 Household wealth composition

The "household wealth index" is calculated from the household's declared ownership of a list of common household items. The value itself is created by totaling the estimated value of each item (indicated in brackets, in USD), converting to KSh, and dividing by 1,000; so the average of 37.2 means that the average household owned approximately 37,200 KSh worth of listed possessions. However, since each possible possession was only counted once, this should not be taken as a reliable estimate, but rather a unitless index of comparison.

This index of household wealth is significantly higher in formal vs. informal areas and non-poor vs. poor households, but not for male-headed vs. female headed households. There are significant differences by area type in the holdings of all classes except farm animals, with higher holdings of goods in formal areas. There are also significant differences between poor and non-poor households, wither higher holdings of goods in non-poor households, except again in farm animal holdings. There are no significant differences by gender of household head in the holdings of any type.

Home and land values questions had a high number of missing or "don't know" responses, which means that the averages shown are drawn from a relatively small group and tests of statistical significance were not possible. The data reveals that for those who owned homes alone values averaged 4,764,600 KSh while for those who owned both home and land combined values averaged 13,226,000 KSh. "Other land and/or residence" values averaged 4,912,000 KSh.

**Table B.3: Household wealth composition**

| Characteristic | All | Location | | Household poverty | | Gender (Informal) | |
|---|---|---|---|---|---|---|---|
| | | Informal areas | Formal areas | Poor | Non-poor | Male-headed | Female-headed |
| Index of household wealth[a] | 37.2 | 27.9 | 43.7 | 26.8 | 44.7 | 26.7 | 28.6 |
| N | 1,178 | 581 | 597 | 535 | 606 | 424 | 127 |
| Household's average holdings of: | | | | | | | |
| Class-1 durables (furniture, pans, iron, mosquito net) [7] | 6.0 | **5.5** | **6.4** | **5.6** | **6.3** | 5.3 | 5.7 |
| Class-2 durables (stove, sewing machine, fan, wheelbarrow, water storage tank) [60] | 1.5 | **1.3** | **1.7** | **1.4** | **1.7** | 1.3 | 1.4 |
| Class-3 durables (refrigerator, washing machine, electric generator, bicycle) [100] | 0.4 | **0.2** | **0.4** | **0.1** | **0.5** | 0.2 | 0.2 |
| Farm animals (poultry and livestock) [200] | 0.1 | 0.1 | 0.1 | 0 | 0.1 | 0.1 | 0.1 |
| Entertainment equipment (radio, TV, satellite dish, DVD, video player) [80] | 2.1 | **1.7** | **2.4** | **1.8** | **2.4** | 1.7 | 1.6 |
| Motorized transport (motorcycle [400], car [1,000]) | 0.1 | **0.0** | **0.1** | **0.0** | **0.1** | 0.0 | 0.0 |
| N | 1,178 | 581 | 597 | 535 | 606 | 424 | 127 |
| Value of primary residence, not its land (in 1,000 KSh)[b] | 4,764 | <u>35</u> | <u>9261</u> | <u>0</u> | <u>4764</u> | <u>95</u> | <u>95</u> |
| N | 9 | 4 | 5 | 0 | 9 | 3 | 1 |
| Value of primary residence and its land (in 1,000 KSh)[b] | 13,226 | <u>13,745</u> | <u>13,107</u> | <u>13,745</u> | <u>13,107</u> | <u>26,415</u> | <u>412</u> |
| N | 40 | 9 | 31 | 9 | 31 | 6 | 3 |
| Value of other land and/or residence (in 1,000 KSh)[c] | 4,912 | <u>72,368</u> | <u>4,229</u> | <u>5,914</u> | <u>4,819</u> | <u>10,717</u> | <u>141</u> |
| N | 37 | 10 | 27 | 4 | 33 | 7 | 3 |

Notes:
a. *This is a class-weighted average of the number of items as disaggregated in this same table, multiplied by the weight given within the square brackets [].*
b. *About 96% of the sample had missing values for this amount, though at about the same frequency across the categories of this table. About half the sample that declared owning land or a residence failed to report its value. Averages are only over households with the asset. See "Proportion of Owners" in Table C.1. Note that values in the last three rows of the table are divided by one thousand.*
c. *Since the survey does not ask the value of these, they have been imputed as a percent of primary residence value where it was declared (see Footnote (b)). These imputations are: land in city (10%), land outside city (5%), residence only in city (40%), and residence only outside of city (28%). If household has both land and structure these are scored separately and added together. In the case where the land of primary residence is not owned the value of the residence is first doubled before the imputations are made.*

## B.4 Household finance

Approximately 73% of all households in Nairobi have a bank account, a number that differs significantly by location; over 80% in formal areas have a bank account while only 61% have a bank account in informal areas. Having a bank account also differs significantly by poverty status; 80% of the non-poor have a bank account while only 64% of the poor have a bank account. The percentage of households with loans sums to 19% across the given sources of loans, and bank loans are the most common source of lending with 9% of all households having a bank loan, on average. The percent of households with a bank loan is significantly higher among non-poor vs. poor households. Consistent with findings mentioned above, far more households (68%) sent money to people not living at the household than received money (20%). Households are significantly more likely to send money if they are non-poor vs. poor and if they were male-headed vs. female-headed. The only significant differences in the percent of households receiving cash from those not living at their residence was by gender of head of household; female-headed households were significantly more likely to receive money than male-headed households (31% vs. 14%).

**Table B.4: Household finance**

| Characteristic | All | Location | | HH poverty | | Gender (Informal) | |
|---|---|---|---|---|---|---|---|
| | | Informal areas | Formal areas | Poor | Non-poor | Male-headed | Female-headed |
| Percent of households with a bank account | 73 | **61** | **81** | **64** | **80** | 62 | 58 |
| N | 1,168 | 576 | 592 | 531 | 604 | 419 | 127 |
| Percent of households with a loan | 20 | 16 | 23 | **14** | **25** | 15 | 18 |
| N | 1,155 | 574 | 581 | 527 | 598 | 417 | 127 |
| Percent of households with a loan from a… | | | | | | | |
| Bank | 9 | 7 | 10 | **5** | **12** | 62 | 58 |
| Microfinance institution | 2 | 1 | 2 | 1 | 2 | 1 | 3 |
| Savings/credit group or co-op | 6 | 5 | 6 | 5 | 7 | 4 | 5 |
| Relative/friend | 2 | 3 | 2 | 1 | 3 | 3 | 2 |
| Informal lender | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| N | 1,178 | 581 | 597 | 535 | 606 | 424 | 127 |
| Percent of HHs receiving cash from those not now living at residence[a] | 20 | 19 | 20 | 18 | 20 | 14 | 31 |
| N | 1,168 | 578 | 590 | 534 | 603 | 421 | 127 |
| Percent of Huseholds sending cash to those not now living at residence[a] | 68 | 73 | 65 | 60 | 74 | 76 | 62 |
| N | 1,171 | 580 | 591 | 535 | 603 | 423 | 127 |

Notes:
  a.   Over the previous twelve months.

## B.5 Household-owned business profile

Twenty-one percent of households own a business, and 56% of these engage in some form of selling. Business ownership is significantly more common in formal areas than informal areas (42% vs. 17%) and among non-poor vs. poor households (25% vs. 17%) but rates of business ownership do not vary significantly by gender of head of household. Most businesses tend to be fairly new and quite small, as the average age for a business is just over one year and the average number of employees is just over two. Over

half of all businesses are not registered at all (55%) and 33% are registered with a local authority; most businesses report paying local market fees (33%) or business permits (37%). The relatively low number of observations at the census tract level means that it is not possible to perform tests of statistical significance for most of Table B.5.

**Table B.5: Household-owned business profile**

| Characteristic | All | Location | | Household poverty | | Gender (Informal) | |
|---|---|---|---|---|---|---|---|
| | | Informal areas | Formal areas | Poor | Non-poor | Male-headed | Female-headed |
| Percent of Households with business ownership, last 12 months | 21 | 17 | **24** | **17** | **25** | 17 | 21 |
| N | 1,175 | 581 | 594 | 535 | 604 | 424 | 127 |
| Type of business:[a] | | | | | | | |
| Manufacturing | 16 | 17 | 16 | 18 | 15 | 17 | 19 |
| Selling | 56 | <u>60</u> | <u>54</u> | <u>64</u> | <u>52</u> | <u>57</u> | <u>65</u> |
| Transport | 4 | 5 | 4 | 3 | 5 | 7 | 0 |
| Professional (including Internet) | 3 | 1 | 5 | 2 | 4 | 2 | 0 |
| Other (barber, cleaning, etc.) | 22 | <u>18</u> | <u>25</u> | <u>15</u> | <u>26</u> | <u>21</u> | <u>14</u> |
| N | 245 | 105 | 140 | 88 | 147 | 71 | 31 |
| Years in operation | 1.1 | <u>1.4</u> | <u>0.9</u> | <u>1.3</u> | <u>1</u> | <u>1.4</u> | <u>1.5</u> |
| N | 239 | <u>102</u> | <u>137</u> | <u>84</u> | <u>146</u> | <u>68</u> | <u>31</u> |
| Number of employees | 2.2 | <u>2.1</u> | <u>2.3</u> | <u>1.8</u> | <u>2.4</u> | <u>2.3</u> | <u>1.8</u> |
| N | 244 | 104 | 140 | 87 | 147 | 70 | 31 |
| Which are… | | | | | | | |
| Household members | 1.2 | <u>1.2</u> | <u>1.2</u> | <u>1.2</u> | <u>1.2</u> | <u>1.3</u> | <u>1.1</u> |
| N | 244 | 104 | 140 | 87 | 147 | 70 | 31 |
| Non-household members | 1 | <u>0.8</u> | <u>1.1</u> | <u>0.6</u> | <u>1.3</u> | <u>0.9</u> | <u>0.7</u> |
| N | 237 | <u>101</u> | <u>136</u> | <u>85</u> | <u>142</u> | <u>68</u> | <u>30</u> |
| Revenue in previous month[b] | 56,017 | <u>44,832</u> | <u>63,233</u> | <u>14,187</u> | <u>78,450</u> | <u>61,808</u> | <u>13,682</u> |
| N | 162 | 79 | 83 | 60 | 100 | 52 | 25 |
| Registration status: | | | | | | | |
| Local authority (municipal or city council) | 33 | 28 | 35 | 21 | 38 | 30 | 26 |
| Kenya Revenue Authority | 18 | <u>17</u> | <u>18</u> | <u>14</u> | <u>20</u> | <u>15</u> | <u>24</u> |
| Registrar of Companies | 7 | <u>9</u> | <u>6</u> | <u>1</u> | <u>11</u> | <u>9</u> | <u>9</u> |
| None of the above | 55 | <u>62</u> | <u>51</u> | <u>59</u> | <u>53</u> | <u>61</u> | <u>62</u> |
| N | 245 | 105 | 140 | 88 | 147 | 71 | 31 |
| Share of businesses making fiscal contributions: | | | | | | | |
| Daily market local fee | 33 | 29 | 35 | 32 | 35 | 31 | 23 |
| Single business permit local fee | 37 | <u>31</u> | <u>40</u> | <u>35</u> | <u>38</u> | <u>30</u> | <u>36</u> |
| Value Added Tax | 10 | <u>9</u> | <u>11</u> | <u>2</u> | <u>15</u> | <u>11</u> | <u>5</u> |
| N | 245 | 105 | 140 | 88 | 147 | 71 | 31 |

*Notes:*
 *a. Households were allowed to choose more than one category so these figures may exceed 100%.*
 *b. Average over only those businesses operating over the period.*

# DWELLING TENURE, SECURITY, AND CHARACTERISTICS

## C.1 Household dwelling characteristics

On average, households in Nairobi have 2.2 members per room, a ratio that is significantly higher in informal vs. formal areas, poor vs. non-poor households, and in male-headed vs. female headed households. Households have less than one bathroom on average, and the average is significantly higher in formal vs. informal areas. Thirty-one percent of households have a kitchen; a figure that is significantly higher in formal vs. informal areas (44% vs. 12%) and in poor vs. non-poor households (40% vs. 18%); the percent of households with a kitchen does not vary significantly by gender of household head.

About 54% of households in Nairobi use paraffin or kerosene as their primary cooking fuel, 32% use gas, 13% use charcoal and none use firewood. In informal areas significantly more households use paraffin/kerosene or charcoal than in informal areas, and in formal area significantly more use gas (44%) than in informal areas (14%). Non-poor households are also significantly more likely to use gas and less likely to use paraffin/kerosene or charcoal than poor households. Primary cooking fuel did not vary significantly by gender of head of household.

Most households are renters (91%), with 8% owning in some form and only 7% owning their land and structure. In formal areas households are significantly more likely to own and less likely to rent vs. informal areas; in formal areas, 10% own land and building, while only about 3% own both in informal areas. Non-poor households are also much more likely to own and less likely to rent vs. poor households; in non-poor households, 10% own land and building, while only about 3% own both in poor households. Ownership does not vary significantly by gender of head of household.

Fully 41% report that the area around their dwelling floods during heavy rains, a figure that is significantly higher in informal areas (59%) than in formal areas (28%). Only 3% percent of households report they are susceptible to mudslides. Fully 38% report that they live within a ten-minute walk of a formal or informal garbage dump, a figure that is significantly and numerically much higher in informal areas (58%) than in formal areas (23%) and also significantly higher in poor vs. non-poor households. Only 10% report they are exposed to factory pollution in their neighborhood, although it is significantly higher in informal areas than in formal areas. None of the hazards differed significantly by gender of household head.

Quality of housing varies significantly across location and by poverty status. More households in informal areas have an earth or clay floor (11%) as compared to informal areas (1%), and the difference is significant. Almost all households have an iron or grass roof (82%), but the proportion is even higher for informal areas vs. formal areas and for poor vs. non-poor households. Over half of households (64%) have stone or brick walls, although it is significantly more common and much higher in formal areas (91%) than informal areas (26%), and among non-poor vs. poor households (70% vs. 57%). Perhaps surprisingly, stone or brick walls are significantly more common in female-headed households than female-headed households in informal areas, although the numerical differences are not as large as by other categories (33% for female-headed vs. 24% male-headed).

## Table C.1: Household dwelling characteristics

| Characteristic | All | Location | | Household poverty | | Gender (Informal) | |
|---|---|---|---|---|---|---|---|
| | | Informal areas | Formal areas | Poor | Non-poor | Male-headed | Female-headed |
| Number of persons per room | 2.2 | **2.4** | **2** | **2.7** | **1.8** | **2.6** | **1.9** |
| N | 1,175 | 579 | 596 | 534 | 605 | 423 | 126 |
| Number of bathrooms | 0.7 | **0.5** | **0.9** | 0.7 | 0.8 | 0.5 | 0.5 |
| N | 1,174 | 579 | 595 | 533 | 606 | 423 | 126 |
| Proportion of residences with kitchen | 31 | **12** | **44** | **18** | **40** | 12 | 14 |
| N | 1,177 | 581 | 596 | 535 | 606 | 424 | 127 |
| Primary cooking fuel: | | | | | | | |
| Electricity | 1 | 1 | 1 | **0** | **2** | 1 | 3 |
| Paraffin or kerosene | 54 | **64** | **46** | **62** | **48** | 66 | 60 |
| Gas | 32 | **14** | **44** | **21** | **40** | 13 | 17 |
| Charcoal | 13 | **20** | **9** | **17** | **11** | 20 | 20 |
| Firewood | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| N | 1,157 | 572 | 585 | 525 | 595 | 416 | 126 |
| Proportion of households that: | | | | | | | |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Owns the land only | - | - | - | - | - | - | - |
| Owns structure only | 1 | 1 | 1 | **0** | **1** | 0 | 2 |
| Owns land and structure | 7 | **3** | **10** | **3** | **10** | 3 | 4 |
| Rents | 91 | **96** | **88** | **96** | **88** | 96 | 93 |
| Squats | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| N | 1,175 | 581 | 594 | 534 | 606 | 424 | 127 |
| Pct. of Households in areas subject to[a]: | | | | | | | |
| Flooding[b] | 41 | **59** | **28** | 43 | 40 | 58 | 63 |
| Mudslides[c] | 3 | **5** | **2** | 3 | 4 | 5 | 6 |
| 10 minute walk to formal or informal garbage dump | 38 | **58** | **23** | **43** | **34** | 59 | 57 |
| Factory pollution (air, water, noise) | 10 | **14** | **6** | 9 | 11 | 14 | 15 |
| N | 1,178 | 581 | 597 | 535 | 606 | 424 | 127 |
| Housing quality: | | | | | | | |
| Pct. with earth/clay floor | 5 | **11** | **1** | 6 | 4 | 10 | 15 |
| Percent with corrugated iron roof | 82 | **92** | **74** | **87** | **77** | 93 | 91 |
| Percent with grass roof | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Percent with stone/brick/block walls | 64 | **26** | **91** | **57** | **70** | **24** | **33** |
| N | 1178 | 581 | 597 | 535 | 606 | 424 | 127 |

Notes:

a. All data is self-reported, and therefore subjective.

b. Households reported that the area floods during heavy rains.

c. Households reported that they are located on a hillside that is subject to mudslides.

## C.2 Home and land ownership

Most Nairobi households (91%) are renters, with only a small percentage (7%) owning their land and structure. Fully 90% of households in Nairobi feel they have secure tenure; this is likely influenced by the fact that only 4% of the households have been evicted in the last 12 months. Half of landowners have a freehold title for their land (51%); the next-most common category is to have no documentation (25%) and 14% have a government certificate of title. There is not enough data at the census tract level to test for significant differences in ownership security or documentation.

On average, households have lived in their current dwelling for 4.9 years and in their current neighborhood for 6.6 years. These figures do not vary significantly by area, poverty status, or gender of head of household.

Home loan payment as a percent of spending payments average 38%; however, there very few observations and not enough data at the census tract level to test for significant differences by category of household.

**Table C.2: Household residence and land tenure**

| Characteristic | All | Location | | Household poverty | | Gender (Informal) | |
|---|---|---|---|---|---|---|---|
| | | Informal areas | Formal areas | Poor | Non-poor | Male-headed | Female-headed |
| Percent of households that: | | | | | | | |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Own the land only | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Own structure only | 1 | 1 | 1 | 0 | 1 | 0 | 2 |
| Own land and structure | 7 | 3 | 10 | 3 | 10 | 3 | 4 |
| Rent | 91 | 96 | 88 | 96 | 88 | 96 | 93 |
| Squat | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| N | 1175 | 581 | 594 | 534 | 606 | 424 | 127 |
| Percent of HHs that feel secure in ownership | 90 | 90 | 90 | 86 | 91 | 91 | 85 |
| N | 87 | 20 | 67 | 20 | 63 | 13 | 6 |
| Variability of households feeling secure[a] | 0.00 | 0.01 | 0.01 | - | 0.01 | - | - |
| N | 87 | 20 | 67 | 20 | 63 | 13 | 6 |
| Percent of Households that experienced eviction | 4 | 5 | 3 | 3 | 4 | 5 | 3 |
| N | 1,175 | 581 | 594 | 534 | 606 | 424 | 127 |
| Proportion of Household owners by type of land-possession document: | | | | | | | |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| None | 25 | 38 | 21 | 49 | 17 | 19 | 66 |
| Freehold title | 51 | 35 | 56 | 32 | 59 | 43 | 27 |
| Temporary occupation license | 3 | 3 | 4 | 0 | 5 | 6 | 0 |
| Share certificate | 2 | 0 | 2 | 3 | 1 | 0 | 0 |
| Government certificate of title[b] | 14 | 17 | 13 | 14 | 12 | 20 | 7 |
| Letter from chief (provincial administration) | 0 | 2 | 0 | 2 | 0 | 4 | 0 |

| Characteristic | All | Location | | Household poverty | | Gender (Informal) | |
|---|---|---|---|---|---|---|---|
| | | Informal areas | Formal areas | Poor | Non-poor | Male-headed | Female-headed |
| Other | 4 | 5 | 4 | 0 | 5 | 9 | 0 |
| N | 103 | 26 | 77 | 29 | 70 | 15 | 10 |
| Neighborhood mobility | | | | | | | |
| Years in dwelling | 4.9 | 4.6 | 5.1 | 4.6 | 5.1 | 5.1 | 4.3 |
| N | 1,173 | 580 | 593 | 532 | 606 | 623 | 423 |
| Years in neighborhood | 6.6 | 6.1 | 7.0 | 6.3 | 6.8 | 6.9 | 5.9 |
| N | 1,171 | 579 | 592 | 531 | 605 | 423 | 126 |
| Home loan payment as a percent of spending power(c) | 38 | 27 | 41 | 51 | 36 | 31 | 23 |
| N | 23 | 4 | 19 | 4 | 18 | 3 | 1 |

Notes:
a. Computed as the intra-class correlation coefficient, where the "class" is the EA. This measures the extent to which households within an EA resemble each other in their feelings of security in ownership. No significance tests performed on this row.
b. Long-term lease from City council/Government.
c. Computed only for those with a housing loan.

## C.3  Distribution of housing values and rents

The average value of homes in Nairobi is about 11.59 million KSh, and 59% of all home values are between 2,500,000-250,000,000 KSh. Among rent-paying tenants, the average rent is 5,446 KSh per month, with the distribution of households skewed towards the higher end of the rent level spectrum; the top two rent categories (2,000-3,499 KSh and 3,500-150,000 KSh) capture 70% of the households reporting rent. In this table there were not enough observations at the census tract level to test for differences among different categories of households.

**Table C3: Distribution of housing values and rents**

| Characteristic | All | Location | | Household has… | | | Household head is…c | | Gender (Informal) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Infor-mal areas | Formal areas | Tenure | Water connec-tion | A busi-ness | Skilled | Un-skilled | Male-headed | Female-headed |
| Average home value (1,000 KSh) a | 11,586 | 11,224 | 11,712 | 13,226 | 15,047 | 17,637 | 8,642 | 13,711 | 20,012 | 197 |
| N | 49 | 13 | 36 | 40 | 34 | 17 | 19 | 30 | 9 | 4 |
| Distribution of home values:    Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 1-8,999 KSh | 8 | 23 | 3 | 0 | 3 | 0 | 19 | 0 | 0 | 52 |
| 9,000-299,999 KSh | 8 | 29 | 0 | 5 | 0 | 11 | 0 | 13 | 42 | 13 |
| 300,000-999,999 KSh | 5 | 18 | 1 | 7 | 3 | 6 | 2 | 8 | 5 | 35 |
| 1,000,000-2,499,999 KSh | 20 | 9 | 24 | 25 | 20 | 26 | 10 | 28 | 17 | 0 |
| 2,500,000-250,000,000 KSh | 59 | 20 | 72 | 63 | 74 | 57 | 69 | 51 | 37 | 0 |
| N | 49 | 13 | 36 | 40 | 34 | 17 | 19 | 30 | 9 | 4 |
| Average monthly rent (tenants)b | 5,446 | 3,294 | 7,099 | | 13,274 | 5,973 | 7,267 | 4,174 | 2,887 | 4,242 |

| Characteristic | All | Location | | Tenure | Household has… | | Household head is…[c] | | Gender (Informal) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Infor-mal areas | Formal areas | | Water connec-tion | A busi-ness | Skilled | Un-skilled | Male-headed | Female-headed |
| N | 1,055 | 550 | 505 | | 222 | 210 | 401 | 654 | 405 | 116 |
| Distribution of monthly rents:  *Total* | 100 | 100 | 100 | | 100 | 100 | 100 | 100 | 100 | 100 |
| 1-899 KSh | 3 | 5 | 2 | | 2 | 5 | 1 | 4 | 5 | 3 |
| 900-1,499 KSh | 10 | 18 | 4 | | 0 | 5 | 7 | 12 | 19 | 21 |
| 1,500-1,999 KSh | 14 | 25 | 5 | | 2 | 8 | 8 | 18 | 26 | 24 |
| 2,000-3,499 KSh | 34 | 34 | 33 | | 12 | 33 | 29 | 37 | 34 | 32 |
| 3,500-150,000 KSh | 39 | 18 | 56 | | 84 | 48 | 55 | 28 | 17 | 20 |
| N | 1,055 | 550 | 505 | | 222 | 210 | 401 | 654 | 405 | 116 |

*Notes:*
a.  *Self-reported, current, monthly, fair-market price (response to the question, "If you were to sell your house, how much do you think you could sell it for?").*
b.  *Excludes imputed owner-occupied rents.*
c.  *Includes those self-declared as "skilled" as well as "professional".*

## C.4  Neighborhood social capital and civic participation

Table C.4 presents findings on households' civic participation, social activism, and social capital. Only 8% of households reported contacting their local council within the last two years, and 16% attended a local forum. Owners were significantly more likely than renters to engage in these types of civic participation; owners contacted local official and attended forums at rates of 15% and 35%, respectively. The rates of civic participation did not significantly differ by area, infrastructure access or gender of household head.

For local elections, turnout was 25% on average; turnout was much higher for the 2007 elections and 2010 referendum (72% and 71%, respectively). Those in the upper half of infrastructure access were significantly more likely than those in the lower half to have voted in the 2007 elections and 2010 referendum, and those in formal areas were more likely to have voted in the referendum that those in informal areas. Male-headed households were significantly more likely to have voted in the 2007 elections and 2010 referendum than female-headed households. A larger proportion of owners than renters voted in the 2007 elections and 2010 referendum.

Thirty-nine percent of households reported having an informal community or neighborhood leader; this was significantly higher among the less advantaged- among those in informal areas vs. formal areas and among the lower half of infrastructure access vs. the upper half. Eleven percent of households took part in a public demonstration or protest in the last two years, a rate which did not significantly differ by area, infrastructure access, gender of household head, or ownership status.

The survey asked respondents whether people in their neighborhood would cooperate if asked by an official to conserve water or electricity because of an emergency, and whether people in their neighborhood look out for each other. On both questions, the results were positive. When asked if people in their community would cooperate if asked by an official, the results averaged 3.1 on a four-point scale (where 4="very likely" and 1="very unlikely" to cooperate). When respondents were asked if they agreed that people

look out and trust each other in their neighborhood, answers averaged 3.7 on a five-point scale (where 1="strongly disagree" and 5="strongly agree"). There were not significant differences on either question by any category.

The majority of households (65%) reported feeling safe in their neighborhood. Higher percentages of households in formal areas and households in the top half of infrastructure access reported feeling safe compared to those in informal areas or with low access to infrastructure.

**Table C.4a: Neighborhood social capital and civic participation**

| Characteristic | All | Location | | Access to infrastructure[a] | | Gender (Informal) | | Tenure[b] | |
|---|---|---|---|---|---|---|---|---|---|
| | | Informal areas | Formal areas | Lower half | Upper half | Male-headed | Female-headed | Own | Rent |
| *Civic participation* | | | | | | | | | |
| Percent of households... contacting local council | 8 | 7 | 8 | 6 | 8 | 8 | 5 | 15 | 7 |
| N | 1,174 | 580 | 594 | 369 | 805 | 423 | 127 | 99 | 1,072 |
| attending a neighborhood forum | 16 | 19 | 14 | 17 | 16 | 20 | 18 | **35** | **14** |
| N | 1,178 | 581 | 597 | 369 | 809 | 424 | 127 | 99 | 1,076 |
| *Social activism* | | | | | | | | | |
| Percent of households voting in... local election[c] | 25 | 24 | 26 | 23 | 26 | 25 | 18 | 19 | 26 |
| N | 1,175 | 581 | 594 | 368 | 807 | 424 | 127 | 99 | 1,073 |
| 2007 general election[c] | 72 | 70 | 74 | **67** | **74** | **73** | **58** | **86** | **71** |
| N | 1,176 | 581 | 595 | 369 | 807 | 424 | 127 | 99 | 1,074 |
| 2010 referendum[c] | 71 | **67** | **74** | **64** | **74** | **69** | **56** | **85** | **70** |
| N | 1,177 | 581 | 596 | 369 | 808 | 424 | 127 | 99 | 1,075 |
| Percent of households with informal community or neighborhood leader | 39 | **50** | **32** | **53** | **34** | 49 | 55 | 50 | 38 |
| N | 1,073 | 535 | 538 | 341 | 732 | 391 | 116 | 93 | 977 |
| Percent of households that took part in a public demonstration or protest | 11 | 12 | 11 | 13 | 11 | 11 | 16 | 15 | 11 |
| N | 1,177 | 581 | 596 | 369 | 808 | 424 | 127 | 99 | 1,075 |

Notes:
a.  Defined by dividing the population in half based on a score assigned using responses from thirteen infrastructure-related questions (see Section 3 of Introduction).
b.  Alternatively, this could be the length of time living in the neighborhood: less/more than (say) 2 years.
c.  Out of all households and not just those registered to vote.

## Table C.4b: Neighborhood social capital and civic participation

| Characteristic | All | Location | | Access to infrastructure[a] | | Gender (Informal) | | Tenure[b] | |
|---|---|---|---|---|---|---|---|---|---|
| | | Informal areas | Formal areas | Lower half | Upper half | Male-headed | Female-headed | Own | Rent |
| *Social capital* | | | | | | | | | |
| Average Household response to: | | | | | | | | | |
| People in my neighborhood cooperate if asked by an official[c] | 3.1 | 3.1 | 3.1 | 3.1 | 3.1 | 3.1 | 3.2 | 3.0 | 3.1 |
| N | 1,149 | 570 | 579 | 364 | 785 | 416 | 124 | 95 | 1,051 |
| People in my neighborhood look out for/trust each other[d] | 3.7 | 3.7 | 3.8 | 3.7 | 3.8 | 3.7 | 3.7 | 3.7 | 3.7 |
| N | 1,173 | 579 | 594 | 367 | 806 | 423 | 126 | 99 | 1,071 |
| Proportion of Households feeling safe from crime in own neighborhood | 65 | **52** | **74** | **40** | **74** | 53 | 49 | **82** | **63** |
| N | 1,176 | 581 | 595 | 369 | 807 | 424 | 127 | 99 | 1,074 |

Notes:
a. *Defined by assigning scores using responses from thirteen infrastructure-related questions.*
b. *Alternatively, this could be the length of time living in the neighborhood: less/more than (say) 2 years.*
c. *Four-point scale where 1="Very unlikely" to 5="Very likely".*
d. *Five-point scale where 1="Strongly disagree" to 5="Strongly agree".*

# INFRASTRUCTURE SERVICES

## D.1a Water Access

Nearly 85% of households have direct access to piped water (55% in compound and 29% directly into the dwelling), while 81% report having nearby access (within 50 meters) to piped water. Direct access to water in the dwelling or compound is significantly more common among non-poor than poor households, especially a private piped water connection (39% of the noon-poor have a private connection while only 15% of the poor do). Differences by location are also significant and numerically large; in formal areas, 40% have a private piped water connection and 70% have access in their compound, while in informal areas only 14% have a private piped water connection and only 49% have access in their compound. Private piped water connections also vary significantly by respondents' security in their home ownership, where "secure" represents owners who feel no one could force them to leave without an official legal process in which they would participate, "insecure" represents owners who feel they could be forced out, and "rent" represents those who rent their homes and therefore have no security of ownership as well as squatters and those who own their dwelling but not land. On average, it takes respondents over one and a half hours per day to obtain water, including travel to and from the water source, waiting time, and filling time. Water costs an average of 708 KSh a month. There was not enough data at the census tract level to test for statistically significant differences between categories of households for the cost of water in time or money.

Despite the fact that nearly 85% of households have direct access to piped water in their dwelling or compound, only 24% of respondents report that piped water is their most important water source. Some 37% of households report a shared yard tap as most important, and 33% list a vendor as their most important water source. There are significant differences in primary water source distribution by ownership status, indicated by italics; 55% of those with secure ownership list piped water as their primary source, while 79% of renters list a shared tap as their primary source, and renters have a variety of primary sources, including shared tap (39%), vendor (35%), and piped (22%). Vendors as a primary source are significantly more common in informal areas where fully 60% of households rely on them, while shared tap and piped water is significantly more prevalent in formal areas, where 48% and 33% of households list them as primary, respectively. Non-poor households are significantly more likely than poor households to cite piped water as their primary source (33% vs.11%), and poor households are significantly more likely than non-poor households to cite vendors as their primary source (41% vs. 26%). Finally, female headed-households are significantly more likely than male headed- households to cite piped water (15% vs. 9%) or bottled water (2% vs. 1%) as their primary source. Of the households that didn't have access to piped water, the main reason given (66%) was because they rented rather than owned their home and their landlord would not pay for a connection; the second most common reason (16%) was inability to afford the initial connection (although relatively few were unable to afford a water bill), and only 4% said service was not available. There was not enough data at the census tract level to test for statistically significant differences between categories of households for the reasons for lack of access to a water connection.

## Table D.1a: Water access

| Characteristic | All | Security of Ownership[a] | | | Location | | Household poverty | | Gender (Informal) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Secure | Inse-cure | Rent | Infor-mal areas | Formal areas | Poor | Non-poor | Male-headed | Fe-male-headed |
| Percent of households with private piped water connection inside dwelling | 29 | 69 | 13 | 26 | **14** | **40** | **15** | **39** | **12** | **20** |
| N | 1178 | 78 | 9 | 1088 | 581 | 597 | 535 | 606 | 424 | 127 |
| Percent of households with piped water connection in compound | 55 | 61 | 92 | 54 | **33** | **70** | **49** | **59** | 33 | 36 |
| N | 1,178 | 78 | 9 | 1,088 | 581 | 597 | 535 | 606 | 424 | 127 |
| Percent of households close to piped water access[b] | 81 | 91 | 100 | 80 | 78 | 88 | 81 | 79 | 79 | 70 |
| N | 502 | 16 | 1 | 485 | 400 | 102 | 282 | 201 | 292 | 83 |
| Monthly cost of water in … Time (minutes)[c] | 708 | 277 | 171 | 724 | 749 | 594 | 620 | 808 | 720 | 776 |
| N | 473 | 18 | 1 | 454 | 378 | 95 | 254 | 202 | 278 | 79 |
| Money (KSh) | 884 | 2075 | 1249 | 743 | 704 | 1121 | 627 | 1093 | 674 | 784 |
| N | 711 | 67 | 7 | 635 | 456 | 255 | 324 | 359 | 330 | 100 |
| Most important water source: *Total* | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Piped | 24 | 55 | 13 | 22 | **11** | **33** | **11** | **33** | **9** | **15** |
| Bottled | 1 | 6 | 0 | 1 | 1 | 2 | 0 | 2 | 1 | 2 |
| Shared tap connection | 37 | 18 | 79 | 39 | **22** | **48** | **42** | 35 | 24 | 20 |
| Vendor (kiosk, tanker, other) | 33 | 9 | 8 | 35 | **60** | **13** | **41** | **26** | 59 | 61 |
| Neighbor(s) | 3 | 10 | 0 | 2 | 2 | 3 | 4 | 2 | 3 | 1 |
| Well/borehole | 2 | 1 | 0 | 2 | 3 | **1** | 2 | 2 | 4 | 1 |
| Natural source outside household | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| N | 1,177 | 78 | 9 | 1,087 | 580 | 597 | 534 | 606 | 424 | 126 |
| No connection due to: | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Other sources available | 4 | 12 | 0 | 4 | 5 | 3 | 5 | 4 | 6 | 3 |
| Renting[d] | 66 | 0 | 0 | 68 | 64 | 70 | 69 | 61 | 62 | 70 |
| Can't afford connection | 16 | 62 | 100 | 14 | 16 | 16 | 12 | 21 | 17 | 16 |
| Can't afford monthly bill | 5 | 3 | 0 | 6 | 7 | 1 | 5 | 7 | 7 | 5 |
| Provider has waiting list | 1 | 9 | 0 | 1 | 2 | 1 | 1 | 2 | 2 | 0 |
| No service available | 4 | 15 | 0 | 3 | 4 | 3 | 5 | 2 | 4 | 4 |
| Other | 3 | 0 | 0 | 3 | 2 | 6 | 4 | 3 | 2 | 2 |
| N | 493 | 16 | 1 | 476 | 392 | 101 | 276 | 199 | 284 | 83 |

Notes:
a. Self-reported; "secure" includes owners who feel no one could force them to leave without an official legal process in which they would participate, "insecure" includes owners who feel they could be forced to leave without an official legal process, and "rent" includes renters, squatters, and people who own their structure but not land.
b. Respondents were asked whether there were dwellings or businesses within 50 meters of their home that had a piped water connection in the dwelling or compound.
c. Calculated as the sum of time spent travelling, waiting in line, and filling containers.
d. House does not have a connection and landlord will not pay for one.

## D.1b Water Quality

For the large number reporting piped and shared taps as primary water source, 71% and 81%, respectively, rated the quality of water as "good." However, among the 468 citing vendors as their primary sources, only 58% rated the quality of water as "good" and almost all of the rest rated the water quality as "fair," and these differences between good and fair ratings were significant. There were also a large number of "fair" ratings for bottled water and wells, although relatively few households cited these as primary water sources. Almost all households (96%) said they used a public water provider, but there was not enough data at the census tract level to test for significance.

In Nairobi, 54% of households treat their drinking water—this percent is significantly higher among households above the poverty line as compared to those below it. Of those who treat their drinking water, only 59% rate their water quality as "good." The most common method of water treatment is boiling (70%) followed by bleach (64%).

**Table D.1b: Water quality**

| Characteristic | All | Household poverty | | Location | | Water quality | | | | | Gender (Informal) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Poor | Non-poor | Informal areas | Formal areas | Good | Fair | Poor | Total | N | Male-headed | Female-headed |
| Water source:[a] Piped | 24 | 11 | 33 | 11 | 33 | 71 | 25 | 3 | 100 | 230 | 9 | 15 |
| Bottled | 1 | 0 | 2 | 1 | 2 | 51 | 38 | 11 | 100 | 18 | 1 | 2 |
| Shared tap connection | 37 | 42 | 35 | 22 | 48 | 81 | 18 | 1 | 100 | 409 | 24 | 20 |
| Other vendor | 33 | 41 | 26 | 60 | 13 | 58 | 35 | 7 | 100 | 468 | 59 | 61 |
| Neighbor(s) | 3 | 4 | 2 | 2 | 3 | 92 | 8 | 0 | 100 | 27 | 3 | 1 |
| Well/Borehole | 2 | 2 | 2 | 3 | 1 | 41 | 55 | 4 | 100 | 23 | 4 | 1 |
| Natural outside-Household source | 0 | 0 | 0 | 0 | 0 | - | - | - | - | 0 | 0 | 0 |
| N | 1,177 | 534 | 606 | 580 | 597 | 810 | 317 | 49 | | | 424 | 126 |
| Water provider: Public | 96 | 98 | 94 | 88 | 98 | 77 | 21 | 2 | 100 | 639 | 87 | 87 |
| Private | 2 | 2 | 1 | 6 | 0 | 68 | 32 | 0 | 100 | 12 | 5 | 9 |
| Self | 1 | 1 | 2 | 4 | 1 | 70 | 30 | 0 | 100 | 11 | 5 | 2 |
| Community | 2 | 0 | 2 | 3 | 1 | 55 | 45 | 0 | 100 | 12 | 3 | 2 |
| N | 675 | 252 | 405 | 180 | 495 | 515 | 140 | 19 | | | 132 | 43 |
| Percent of households treating drinking water | 54 | 48 | 58 | 55 | 53 | 59 | 36 | 5 | 100 | 614 | 53 | 59 |
| N | 1,177 | 534 | 606 | 580 | 597 | 810 | 316 | 49 | | | 423 | 127 |
| Treatment method:[b] Boiling | 70 | 73 | 68 | 68 | 72 | 55 | 40 | 6 | 100 | 423 | 66 | 73 |
| Add bleach/chlorine | 64 | 30 | 41 | 39 | 34 | 60 | 35 | 6 | 100 | 224 | 217 | 69 |
| Other (sieve, filter, settle) | 3 | 1 | 3 | 2 | 3 | 69 | 31 | 0 | 100 | 14 | 2 | 0 |
| N | 615 | 252 | 339 | 303 | 312 | 356 | 226 | 32 | | | 217 | 69 |

Notes:
a. *Most important water source.*
b. *Since multiple responses were permitted, the sum can exceed 100%. Likewise, "Other" is not shown, since it was negligible, so the sum may also be less than 100%.*

## D.2a Electricity and waste-disposal services

Fully 84% of respondents reported access to electricity, a figure that differs significantly by location (92% in formal areas have access vs. 71% in informal areas) but not by poverty or gender of head of household. Reasons for not having a connection are similar to those for water—the primary reason reported was that households did not own their home and didn't have a choice (70%), followed by inability to pay for the initial connection (15%). In this section there were not enough observations at the census tract level to test for differences among different categories of households.

Forty-seven percent of respondents reported functional street lighting in their area, a figure that differs significantly by location with formal areas more likely to have functional street lighting; however, it did not vary significantly by poverty status. The average monthly cost of electricity is 1,064 KSh, with 5% of households not paying for electricity at all. Fifty percent of households pay a utility company, while 18% of households either pay as part of their rent or directly to their landlord and 19% pay a third party. In Nairobi, 32% of households experience power outages at least once per week.

To dispose of their garbage, most households dispose of refuse through a city, community, or private collection system (65%), although this is much higher in formal areas (81%) than informal ones (43%); this difference is significant. Only 26% of households report dumping their trash. Eighty-five percent of households report they must pay for garbage collection. Dumping is significantly more common in informal areas and among poor households than non-poor households, and burning is more common in non-poor households. There were no significant differences by gender of head of household.

**Table D.2a: Access to electricity and waste-disposal**

| Characteristic | All | Location | | Household poverty | | Gender (Informal) | |
|---|---|---|---|---|---|---|---|
| | | Informal areas | Formal areas | Poor | Non-poor | Male-headed | Female-headed |
| **Electricity** | | | | | | | |
| Proportion of households with access to electricity | 84 | **71** | **92** | 80 | 86 | 72 | 68 |
| N | 1,178 | 581 | 597 | 535 | 606 | 424 | 127 |
| Reason for no connection:     *Total* | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Renters | 70 | 69 | 73 | 81 | 58 | 68 | 71 |
| Firm has waiting list | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Cannot afford connection | 15 | 15 | 15 | 9 | 22 | 17 | 13 |
| Cannot afford monthly bill | 8 | 9 | 7 | 5 | 12 | 6 | 14 |
| Other | 6 | 6 | 5 | 3 | 7 | 7 | 2 |
| N | 215 | 167 | 48 | 117 | 93 | 117 | 40 |
| Percent of households with mostly functioning street lighting | 47 | 35 | 56 | 46 | 48 | 37 | 26 |
| N | 1,178 | 581 | 597 | 535 | 606 | 424 | 127 |
| Average monthly bill, KSh | 1064 | 689 | 1262 | 669 | 1296 | 687 | 631 |
| N | 1,178 | 581 | 597 | 535 | 606 | 424 | 127 |
| Percent of households not paying for electricity | 5 | 5 | 5 | 6 | 4 | 6 | 2 |
| N | 685 | 289 | 396 | 270 | 393 | 211 | 61 |

| Characteristic | All | Location | | Household poverty | | Gender (Informal) | |
|---|---|---|---|---|---|---|---|
| | | Informal areas | Formal areas | Poor | Non-poor | Male-headed | Female-headed |
| Payment to: *Total* | | | | | | | |
| Utility | 50 | <u>34</u> | <u>58</u> | <u>39</u> | <u>55</u> | <u>31</u> | <u>44</u> |
| Prepaid card | 12 | <u>5</u> | <u>16</u> | <u>3</u> | <u>17</u> | <u>3</u> | <u>8</u> |
| Landlord | 18 | <u>28</u> | <u>12</u> | <u>24</u> | <u>14</u> | <u>29</u> | <u>21</u> |
| Third party (from utility power line) | 19 | <u>31</u> | <u>13</u> | <u>32</u> | <u>12</u> | <u>34</u> | <u>25</u> |
| N | 653 | 277 | 376 | 256 | 375 | 200 | 60 |
| Percent of households with outages at least once weekly | 32 | <u>51</u> | <u>23</u> | <u>38</u> | <u>29</u> | <u>50</u> | <u>49</u> |
| N | 958 | 411 | 547 | 414 | 512 | 305 | 86 |
| *Refuse disposal* | | | | | | | |
| Main method: | | | | | | | |
| Dumping | 26 | **45** | **13** | **31** | **22** | 44 | 47 |
| Burying | 0 | 1 | 0 | 1 | 0 | 1 | 1 |
| Burning | 7 | 8 | 6 | **5** | **8** | 9 | 7 |
| Collection system[a] | 65 | **43** | **81** | 61 | 68 | 43 | 43 |
| N | 1,178 | 581 | 597 | 535 | 606 | 424 | 127 |
| Proportion of Households paying for collection | 85 | <u>62</u> | <u>95</u> | <u>84</u> | <u>87</u> | <u>62</u> | <u>69</u> |
| N | 737 | 252 | 485 | 319 | 394 | 180 | 57 |

Notes:
a. *Run by city, community, or private firm.*

## D.2b  Access to sanitation services

On average, only 26% of households have a toilet in their home, but a private toilet is more than twice as common among non-poor vs. poor households (36% vs. 13%) and more than three times as common in formal areas than informal ones (38% vs. 10%); both differences are significant. The most common type of toilet system is a flush toilet (used by 53%) followed by a public/shared latrine (32%) and an individual pit latrine (11%). In formal areas, flush toilets are significantly and numerically much more common (72%) than in informal areas (26%), while public/shared latrines are significantly more common in informal areas (49%) than in formal areas (19%). The use of flush toilets is also significantly higher in non-poor vs. poor households (59% vs. 46%) while public/shared latrines are significantly more common in poor households (36%) than non-poor (27%).

Seventy-two percent of households report they share their toilet with other households, and 27% share with ten or more households. By area, the differences in sharing are significant and large; in formal areas, 38% of households have their own toilet and only 11% share with ten or more households, while in informal areas only 11% have their own toilet and 50% share with ten or more households. Toilet sharing also varies significantly by poverty status, with the non-poor more likely to have their own toilet and less likely to share with other households than poor households. Finally, toilet sharing also varies significantly by gender of head of household, with female-headed households more likely to have their own toilet and less likely to share with ten or more households than male-headed households, although the numerical differences are not as large as by other categories.

Half of households (54%) use a legal sewer as their toilet disposal system and 34% use a pit latrine. There was not enough data at the census tract level to test whether toilet disposal systems differed significantly by household characteristics.

Grey water, i.e. used kitchen or bath water, is dumped into a nearby drain by 72% of households and poured onto the road by 23% of households. Poor households are significantly more likely to pour grey water onto the road than non-poor households, as are informal area households vs. those in formal settlements. Female-headed households are also significantly more likely to pour grey water onto the road than male-headed households.

**Table D.2b: Access to sanitation**

| Characteristic | All | Location | | Household poverty | | Gender (Informal) | |
|---|---|---|---|---|---|---|---|
| | | Informal areas | Formal areas | Poor | Non-poor | Male-head-ed | Fe-male-head-ed |
| Percent of households with toilet in home | 26 | **10** | **38** | **13** | **36** | **8** | **13** |
| N | 1,178 | 581 | 597 | 535 | 606 | 424 | 127 |
| Type of toilet system:*Total* | | | | | | | |
| Pit latrine (individual) | 11 | **17** | **7** | 12 | 11 | 15 | 21 |
| VIP latrine | 1 | 0 | 1 | 1 | 1 | 0 | 1 |
| Flush toilet/WC | 53 | **26** | **72** | **46** | **59** | 26 | 29 |
| Public/shared latrine | 32 | **49** | **19** | **36** | **27** | 50 | 47 |
| Paid shared latrine | 3 | **6** | **0** | 4 | 2 | 8 | 3 |
| N | 1,178 | 581 | 597 | 535 | 606 | 424 | 127 |
| Percent of households sharing toilet: | | | | | | | |
| Doesn't share | 27 | **11** | **38** | **13** | **38** | **9** | **17** |
| Shares with 2-9 other households | 45 | **39** | **50** | **56** | **39** | **37** | **44** |
| Shares with 10+ other households | 27 | **50** | **11** | **31** | **24** | **54** | **39** |
| N | 1,166 | 569 | 597 | 527 | 602 | 416 | 125 |
| Type of disposal system for toilet: | | | | | | | |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Pit latrine | 34 | <u>62</u> | <u>14</u> | <u>39</u> | <u>30</u> | 61 | 63 |
| Sewer (legal) | 54 | <u>26</u> | <u>74</u> | <u>51</u> | <u>57</u> | 27 | 24 |
| Sewer (informal) | 4 | <u>4</u> | <u>5</u> | <u>6</u> | <u>3</u> | 4 | 4 |
| Septic tank/soak pit | 7 | 7 | 7 | 2 | 10 | 6 | 8 |
| N | 1,133 | 560 | 573 | 515 | 582 | 408 | 125 |
| Disposal of "grey water":*Total* | | | | | | | |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Dump into drain | 72 | **57** | **83** | **68** | **76** | **60** | **47** |
| Pour onto road | 23 | **39** | **12** | **28** | **20** | **35** | **50** |
| Pour into latrine | 1 | 1 | 1 | 2 | 1 | 1 | 1 |
| Other | 3 | 3 | 3 | 2 | 3 | 3 | 1 |
| N | 1,178 | 581 | 597 | 535 | 606 | 424 | 127 |

## D.3 Access to transport

Sixty-nine percent of respondents said they work outside their neighborhood. The main modes of travel to work or school are walking (46%) and matatus (44%).[15] Those in informal areas are significantly more likely to walk than those in formal areas, who are significantly more likely to use a matatu. Students are also significantly more likely to walk than workers, who are who are significantly more likely to use a matatu. Only two percent of household members drove to work or school in their own vehicle.

The average time it takes household members to get to work/school is 28 minutes and the average cost is 103 KSh; travel time is very similar between those who study and those who work, and between informal areas and formal areas, but the differences are significant.

**Table D.3: Access to transport**

| Characteristic | All | Household activity[a] | | Location | | Household poverty | | Gender (Informal) | |
|---|---|---|---|---|---|---|---|---|---|
| | | Work | Study | Informal areas | Formal areas | Poor | Non-poor | Male-headed | Female-headed |
| Percent who work or study… | | | | | | | | | |
| inside the neighborhood | 29 | | | 30 | 28 | 33 | 27 | 29 | 33 |
| outside the neighborhood | 69 | | | 69 | 70 | 66 | 71 | 69 | 66 |
| inside *and* outside the neighborhood | 2 | | | 2 | 2 | 1 | 2 | 2 | 1 |
| N | 1,800 | | | 785 | 1,015 | 809 | 939 | 603 | 146 |
| Main mode of travel[b] Walk | 46 | **48** | **74** | **57** | **40** | 57 | 39 | 59 | 59 |
| Bicycle | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 0 |
| Own vehicle | 4 | **4** | **2** | 3 | 5 | 0 | 7 | 2 | 3 |
| Matatu | 44 | **46** | **19** | **36** | **49** | 40 | 48 | 36 | 34 |
| Shared taxi | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bike taxi | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Municipal bus | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 |
| N | 2,443 | 685 | 406 | 1,091 | 1,352 | 1,137 | 1,235 | 828 | 208 |
| Transport time (minutes) | 28 | **28** | **22** | **25** | **30** | 26 | 30 | 25 | 26 |
| N | 2,388 | 669 | 398 | 1067 | 1321 | 1119 | 1209 | 807 | 206 |
| One-way trip cost to work/school (KSh) | 103 | 130 | 104 | 125 | 93 | 73 | 97 | 83 | 299 |
| N | 1,081 | 319 | 68 | 387 | 694 | 407 | 644 | 290 | 72 |
| Households with road access as: Poor | 22 | | | **30** | **16** | **26** | **19** | 30 | 31 |
| Good | 78 | | | **70** | **84** | **74** | **81** | 70 | 69 |
| N | 1,177 | | | 580 | 597 | 535 | 606 | 423 | 127 |
| Percent of households with limited road access during rainy season | 11 | | | **21** | **3** | 12 | 10 | 21 | 21 |
| N | 1,177 | | | 580 | 597 | 535 | 606 | 423 | 127 |

*Notes:*
1. *Informal areas only.*
2. *To work or to school. May not add to 100% since "Other", which was negligible, is not reported in table.*

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[15] *A "matatu" is a 14-seater minivan used throughout Kenya as a form of public transport.*

Fully 78% of households reported having good road access, although it is significantly lower in informal areas than formal areas and among poor than non-poor households. Eleven percent of all households said they had limited road access during the rainy season, but this was significantly more likely in informal areas, where 21% reported limited access.

## D.4 Access to communications

Almost no households have a functioning land line, but each household owns an average of two mobile phones, and there are statistically significant differences between the number of mobile phones owned by non-poor vs. poor households, in formal areas vs. informal areas and in male-headed vs. female-headed households. Mobile banking (such as M-PESA) use is 92% on average, and the rate of mobile banking usage is significantly higher in in formal areas vs. informal areas. Overall, 18% of households have a functioning computer, and this rate is significantly higher in formal areas vs. informal areas and in non-poor vs. poor households. Twenty-nine percent of households use the internet; this is also significantly higher in formal areas vs. informal areas, as well as in non-poor vs. poor households.

**Table D.4: Access to communications**

| Characteristic | All | Location | | Household poverty | | Gender (Informal) | |
|---|---|---|---|---|---|---|---|
| | | Informal areas | Formal areas | Poor | Non-poor | Male-headed | Female-headed |
| Percent of households with functioning land line | 1 | 1 | 1 | 1 | 2 | 0 | 2 |
| N | 1,177 | 581 | 596 | 535 | 605 | 424 | 127 |
| Average number of mobile phones owned by household | 2.0 | **1.7** | **2.2** | **1.8** | **2.1** | **1.8** | **1.5** |
| N | 1,169 | 576 | 593 | 534 | 600 | 421 | 125 |
| Percent of households using mobile banking | 92 | **90** | **94** | 91 | 94 | 90 | 88 |
| N | 1,176 | 580 | 596 | 534 | 606 | 424 | 126 |
| Percent of households with functioning computer | 18 | 9 | **24** | **6** | **26** | 8 | 10 |
| N | 1,177 | 581 | 596 | 535 | 606 | 424 | 127 |
| Percent of households using internet (any means) | 29 | **18** | **37** | **16** | **38** | 18 | 16 |
| N | 1,173 | 579 | 594 | 531 | 605 | 422 | 127 |

## D.5 Access to infrastructure indicator

The access to infrastructure indicator combines six categories of infrastructure (divided into 13 subcategories) weighted by importance to the household and summed to create a household indicator from 0 to 9.5.[16] Higher scores represent better access to infrastructure. This indicator provides an overall understanding of a household's infrastructure access. By averaging households' scores on the indicator, we can quickly compare infrastructure access in informal and formal areas, between poor and non-poor households, and between male- and female-headed households in informal areas.

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[16] *The 13 subcategories are: piped water (1 point); shared/indirect connection (0.5 points); direct electricity access (1); street lighting (0.5); garbage collection system (1); own toilet (1); shared toilet with less than 20 other people (0.5); legal sewer system for toilet (0.5); grey water not poured onto street (0.5); good road access at dwelling (0.5); road access not limited during rainy season (0.5); no flooding (1); no mudslides (1).*

Table D.5 presents household mean scores on the access-to-infrastructure indicator. The mean score across all households in Nairobi is 5.15. Households in formal areas score significantly higher than households in informal areas, and the difference in mean scores is more than two, which is notable – this means that on average informal area households have two more services available to them. There are also significant differences between poor and non-poor households, though they are not of the same magnitude (4.72 and 5.45 respectively). There are no significant differences in infrastructure score by gender.

**Table D.5: Access to infrastructure indicator**

| Characteristic | All | Location | | Household poverty | | Gender (Informal) | |
|---|---|---|---|---|---|---|---|
| | | Informal areas | Formal areas | Poor | Non-poor | Male-headed | Female-headed |
| Mean score on access to infrastructure indicator | 5.15 | **3.84** | **6.07** | **4.72** | **5.45** | 3.84 | 3.81 |
| N | | 1178 | 581 | 597 | 535 | 606 | 424 | 127 |

# CONCLUSIONS

The following three figures are "Development Polygons". These polygons are meant to complement the detailed tables presented in sections A through D by illustrating an "overall" sense of the state of the city. We present information for all areas, along with formal and informal areas, in each of the three figures: the Development Diamond, the Infrastructure Polygon, and the Living Conditions Diamond.[17] In all figures, the value labels included provide the value of the indicator for all areas. The statistics underlying these figures are also in the tables, above. Similar graphics also appear in the City-at-a-Glance Reports and the Overview Report produced under the NORC contract.

The axes for all figures represent percentages. Polygons with larger areas represent "better" situation in regards to the associated indicator(s). Hence, a polygon with full coverage would indicate that the city is doing very well in terms of development, infrastructure, or living conditions.

The Development Diamond (Figure 1) maps four indicators of poverty—welfare, employment, education, and living conditions. In three quarters of the development diamond—welfare, employment, and education - formal and informal areas are similarly situated. Overall, 56% of households have expenditures above the poverty line, 61% of adults are employed, and 75% of adults completed primary education. However, households in formal areas far outpace the households in informal areas in terms of living conditions – whereas in formal areas, 38% of households have permanent walls and access to both piped water and electricity, this figure is only 14% in informal areas.

The Infrastructure Polygon, shown in Figure 2, presents residents' access to ten different types of infrastructure—piped water, electricity, private toilets, sewage, drainage, garbage collection, street lighting, mobile phones, public transport, and good roads. For most infrastructure types, households in formal areas report much higher rates of access than households in informal areas. This includes piped water (84% in formal areas vs. 36% in informal areas), electricity (92% vs. 71%), private toilets (38% vs. 10%), sewage (74% vs. 26%), drainage (63% vs. 35%), and street lighting

**Figure 1: Development Diamond**



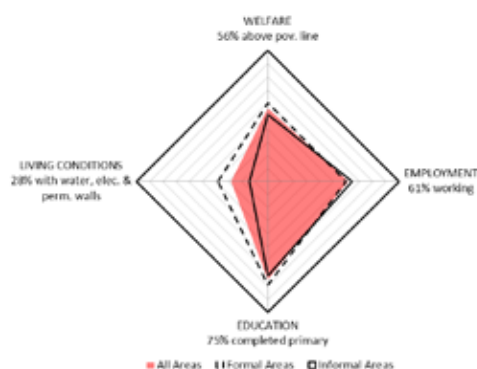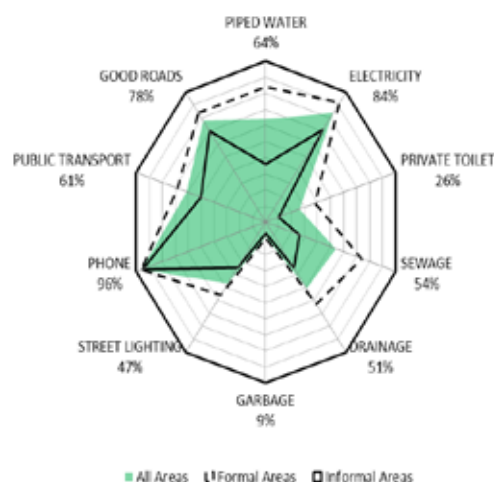**Figure 2: Infrastructure Polygon**



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[17]  *The basic format for all three figures appear in the World Bank Policy Research Working Paper, "Poverty, Living Conditions, and Infrastructure Access" A Comparison of Slums in Dakar, Johannesburg, and Nairobi" by Sumila Gulyani, Debabrata Talukdar, and Darby Jack (2010). We strived to make our own figures as similar as possible, though some deviations, noted in the accompanying text, were necessary.*

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(56% vs. 35%). In formal areas, households also have better access to public transit and good roads than households in informal areas; though the differences are much smaller than those exhibited in the aforementioned infrastructure, they remain substantial. In terms of garbage collection and mobile phone usage, formal areas and informal areas are more or less the same.

**Figure 3: Living Conditions Diamond**

Figure 3 presents the Living Conditions Diamond. The four axes of this diamond are the infrastructure score (scaled to a percentage of the total possible points), unit conditions, neighborhood and location, and home ownership. The first three indicators have overall coverage between 54% and 65%. The difference between formal and informal areas with regards to unit conditions is especially striking—only 26% of households in informal areas have permanent walls, compared to 91% in formal areas. Home ownership is quite rare, with less than 10% of households in Nairobi owning their dwelling.
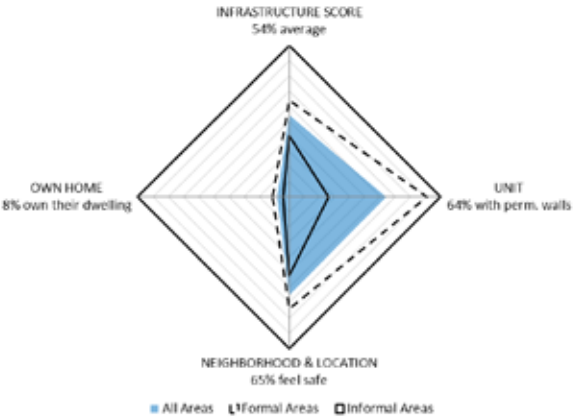
BILL&MELINDA
GATES *foundation*

**Cities Alliance**
Cities Without Slums

SWEDEN